BRITISH ELECTRICITY HISTORY

Introduction to the website

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Introduction to the website

Public electricity supply began in Britain in the early 1880s. By 1900 most urban places with a population of over 50,000 had some form of service at least in the town centre. As more places developed a local system, the national pattern became more complex and fragmented. In 1931 there were 666 separate electricity undertakings in Great Britain and some 560 remained at nationalisation in 1948.

This website is a guide to the structure, organisation and geography of public electricity supply from the beginning to the late 1950s when electrification of all but the most remote places had been completed. Fifteen basic chapters cover the mainland and additional chapters provide a similar coverage for Ireland and the Island Dependencies.

Figure 1 ELECTRICITY BOARD AREAS 1948.

Each of the British chapters is based on the Area Boards defined in the Electricity Act 1947. Many of the boundaries were established earlier, in the 1920s, and there is continuity of the 1948 areas to the present.[1] The Areas generally served as a good base for the regional studies except for Greater London which was awkwardly divided among four Area Boards.[2] (**Figure 1**)

Chapters follow a similar pattern beginning with the geographical organization in April 1948. The development of electricity supply follows, arranged in three parts:

Local Initiatives (1880-1919) outlines the evolution of local authority and company systems, electric tramways and some examples of private generation.

State Intervention (1920-1948) covers the work of the Electricity Commissioners and the national transmission grid built by the Central Electricity Board. Detailed tables report generating capacity, per capita electricity consumption, and the roles of holding companies.

Nationalisation (1948-) notes some of the main work of the Area Boards and the expansion of generating capacity and transmission lines by the British Electricity Authority/Central Electricity Authority/Central Electricity Generating Board in the first decade of operation.

By 1958/59 all the pre-nationalisation plans had been completed and the new CEGB was poised to expand what had become a national system on a much larger scale. Expansion included the new technology of nuclear power, the introduction of much larger turbo-generators and consequently very large power stations, and the extension of the high-voltage Supergrid from Northern Scotland to Southwestern England. The results of the post-1960 expansion of electricity supply and usage deserve more attention than was possible.

The scale and pace of national electrification in the three phases of development are expressed in **Figure 2.** During the Local Initiatives phase the pioneers of electricity had to build expensive generating and distribution systems in competition with gas and steam power. Per capita electricity consumption rose from 1kWh in 1895 to 50kWh in 1915 and 77kWh in 1919. Expansion was very substantial from 1920 to 1947, rising from 76kWh to 747kWh while the number of consumers grew from an estimated 1 million to 11,917,000.[3] In the first decade of nationalisation per capita consumption doubled from 747kWh to 1,790kWh in 1958/59.[4]

I hope that this website will stimulate more interest in the rich history of electrification. There is much forgotten material to be discovered in libraries and archives can illumine our knowledge of local and regional systems in the past. The origin of local systems was always a complex interplay of politics and personalities. Why were some places leaders while others of a similar size were laggards?[5]

Much of the physical evidence of earlier stages of electrification has now disappeared. A few substations (where motor generators converted AC to DC) have survived as have AC transformer kiosks with the

[1]Although most of the functions of the Electricity Boards were gradually sold off after privatisation in 1990, the areas continued to be used as the franchise units for the Distribution Network Operators (DNO). The DNOs provide the vital link between the generation and transmission sectors and the consumer.

[2]An appendix to the London chapter provides a guide to the various definitions of London.

[3]***Twenty-third and Final Report of the Electricity Commissioners, 1 April 1947 to 31 July 1948*** (London: HMSO, 1950), p.6.

[4]Leslie Hannah, ***Engineers, Managers and Politicians: the first fifteen years of nationalised electricity supply in Britain*** (London: Macmillan, 1982), p.292.

[5]Leamington Spa began a public electricity supply in 1887. Other places with similar or smaller size (around 25,000 in 1891 census) developed local systems at varying dates: Hove 1892, Ayr 1896, Peterborough 1900, Arbroath 1908, Llanelli 1911, Workington 1925.

insignia of long-forgotten local authorities and companies. Coal-fired power stations, once the dominant form of electricity generation, have by 2022 been reduced to only three: Kilroot (commissioned in 1981), Radcliffe (1967) and West Burton (1969). Most of the hydro-electric stations remain in service.[6] A few pre-1914 power stations have been converted to other uses. Examples include the Electric Theatre in Guildford, the Borders Distillery in Hawick and a fitness centre in Exeter. Sections of the original grid built in the 1930s remain in service. The Supergrid, the high-voltage transmission system largely built between 1950 and 1970, continues to be a key part of the national infrastructure now linking very different types of power generation with the consumer.

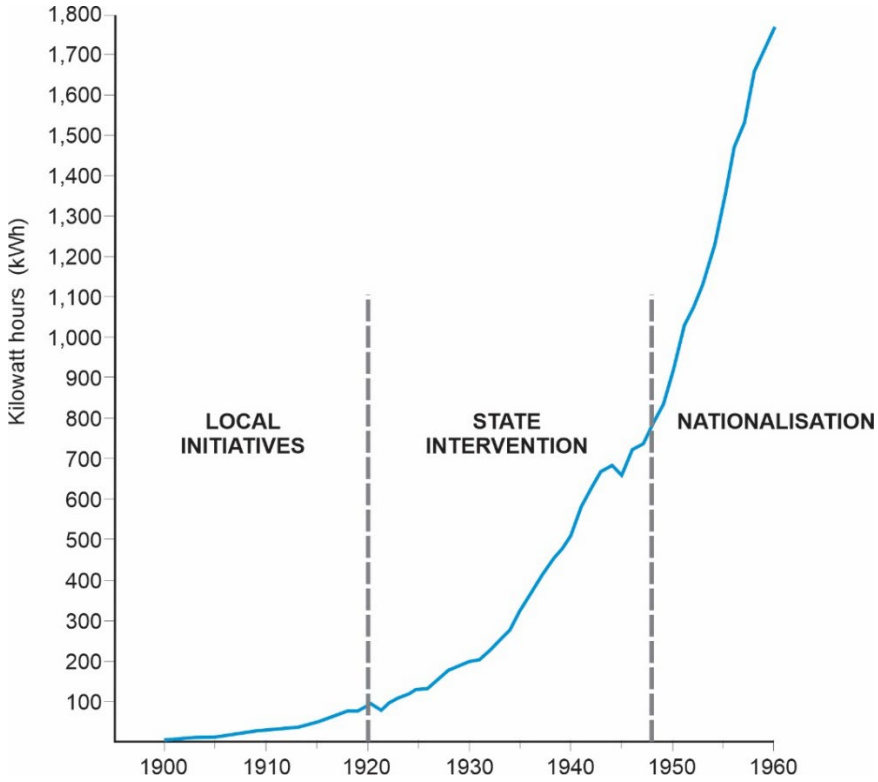

Figure 2 GREAT BRITAIN; PER CAPITA ELECTRICITY CONSUMPTION.

Legislation

Many of the distinctive features of the British electricity supply industry were shaped by legislation from Westminster. The principal Acts were as follows:

Local Initiatives
Electric Lighting Act 1882
Electric Lighting Act 1888
Power Company Acts (20) 1900-1904

[6]Cwm Dyli hydro-electric power station in North Wales, opened in 1906 by the North Wales Power Co., has operated continuously since then and is the oldest active station in the country. The equipment was renewed in 1990.

Electric Lighting Act 1909

State Intervention

Electricity (Supply) Act 1919
Electricity (Supply) Act 1926
Hydro-Electric Development (Scotland) Act 1943

State control/Nationalisation

Electricity Act 1947
Electricity Reorganisation (Scotland) Act 1954
Electricity Act 1957

Privatisation

Electricity Act 1989

The 1882 Act with some later modifications cast a long shadow over the industry, entrenching what became a fragmented structure of local authority and company undertakings. Twenty Power Company Acts passed between 1900 and 1904 added another layer of complexity.

State intervention beginning in 1919 attempted to restructure the fragmented industry. While a national transmission system and more rationalised generation were developed, the distribution of electricity remained fragmented.

Nationalisation in 1948 brought a new order to generation and distribution. Later changes created a new structure for Scotland and for England and Wales in 1957.

The Electricity Act 1989 privatised the industry and in section 18 the last vestiges of the 1882 Act were finally repealed.

Details of the legislation are usefully summarized in the Electricity Council's ***Electricity Supply in the United Kingdom: A Chronology*** (London: Electricity Council. 4th Edition, 1987). 201pp.

Definitions

Electricity Supply Industry: Includes three sectors.

a) Generation where primary energy of various types such as coal, water, gas, wind and solar is converted into electricity at a power station.
b) Transmission (at high voltages) moves the current over long distances.
c) Distribution (at low voltages) provides the final link to the consumer.

The sectors are all connected by wire, cable and transformers to allow flows of current from generation to the various uses by the consumer. This form of integration was developed by 1900 with the use of alternating current (AC) that allowed for an increased distance between the power station and the point of consumption. Earlier direct current (DC) systems could serve only limited areas, rarely more than a 1.5-mile radius from the generating plant.

Public Electricity Supply: Includes all types of organisations that generate and supply electricity for sale to all types of consumers. Public supply systems operate within defined franchise areas regulated by the state.

Private Electricity Supply: today covers large industrial plants such as iron and steel works, oil refineries and chemical works that produce excess heat which is used for generating electricity for their own use.

In the past many types of establishments generated their own power. Examples include railway and tramway operations, factories, theatres, department stores, offices and country houses.

Electronic and electrical equipment manufacturing and the installation and servicing of electrical systems and equipment are separate economic activities and not part of the supply industry.

Local Systems and Networks

Electric current was delivered to the customer by cable or wire owned and operated by a local system. Before nationalisation there were three main types of local system:

a) Autonomous systems with generation, transmission and distribution directly to the customer's meter. Before the 1920s interconnection between autonomous local systems was rare.
b) A distribution system but without any generating facilities. Such systems bought in bulk from a neighbour or a power company.
c) Local distribution, owned and operated by a larger organisation usually serving multiple areas and interconnected by a high-voltage transmission system. Power companies were most active in this type of organisation.

West Yorkshire, a complex urbanised region,[7] is used here to explore the features of local systems. **Figure 3** shows the pattern in 1904 when 16 autonomous local systems (15 local authorities and one company) were operating in the region. The size and shape of each local system followed local government boundaries and were authorised by an Electric Lighting Order (the operating franchise granted under the Electric Lighting Act 1882 and subsequent legislation). Each system had a generating station generally powered by steam engines,[8] and a network of distribution mains mostly concentrated in or near the town centre. Most local systems had chosen DC power while others selected AC but at different frequencies.[9] These differences effectively prevented any interconnection—a feature that would create problems in the future. Bradford Corporation supplemented its original DC supply with AC (50Hz) in 1907 to serve the outlying suburban zone beyond the economic limits of DC power.

Power companies, allowed by Parliament from 1900,[10] added a new dimension to electricity supply. They were organised at a regional scale with a large AC power station that could generate electricity at lower cost and transmit power over longer distances. The intent was to offer bulk supply to existing local systems as well as providing electricity to large industrial concerns such as mills and collieries. In practice the local authority systems were opposed to the formation of power companies and generally resisted taking any bulk supply until World War I.

[7] T.W. Freeman, ***The Conurbations of Great Britain*** (Manchester: Manchester University Press, 1959). Chapter 6, "West Yorkshire", describes the complexities of local government in the area.
[8] The small Roundhay company used gas engines for generation.
[9] The various frequencies in 1899 were: 60Hz Morley, Wakefield; 80Hz Halifax; 83Hz Leeds (changed to 50Hz in 1902); 100Hz Huddersfield. The electric tramways in the region also worked on different track gauges: Halifax 3ft 6ins; Bradford and Keighley 4ft 0ins; Huddersfield 4ft 7¾ins. Leeds and the other systems had the standard gauge of 4ft 8½ins.
[10] Sir James Kitson, later Lord Airedale (1835-1911), a Leeds industrialist and Liberal MP for Colne Valley, assisted with the passage of power company bills in the 1900 Session by what became known as the "Kitson Clause". The clause safeguarded the privileges of all existing company and local authority undertakings, allowing them to opt out of any larger system.

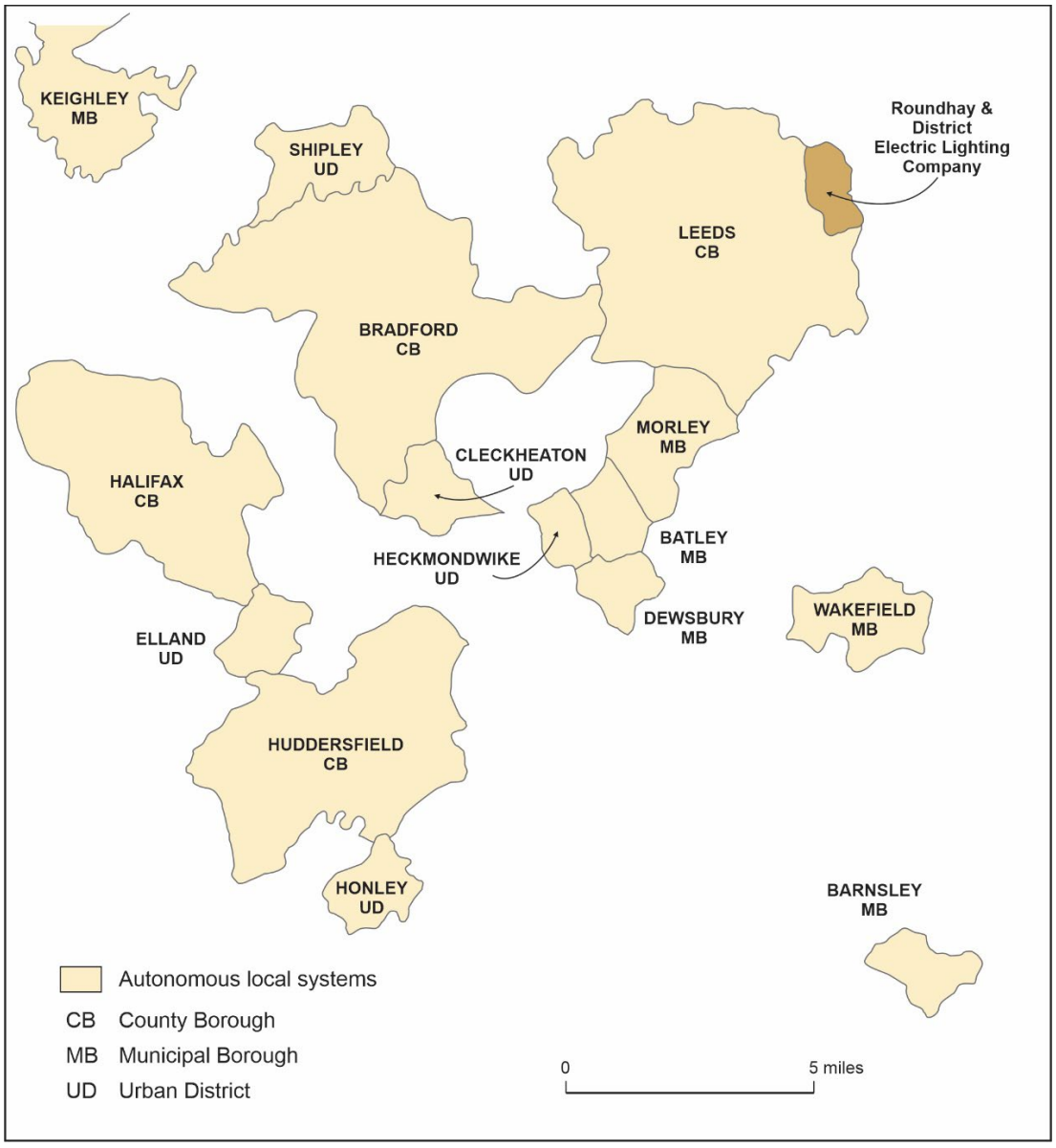

Figure 3 WEST YORKSHIRE; LOCAL SYSTEMS 1904.

The Yorkshire Electric Power Company was established in 1901 after a difficult passage of the special Act through Parliament.[11] Then followed a struggle to raise the capital needed to build the infrastructure to serve a territory of over 1,000 square miles. The new company focused its attention on the core area of West Yorkshire, building a large turbine-equipped power station at Thornhill, Dewsbury. This was an excellent site on the banks of the River Calder with ample supply of cooling water. An adjacent canal and railway gave access for coal supply and there was space for future expansion. A network of 11kv cables and overhead lines radiated from the power station to serve the potential market.

[11] The cost of the special Act and the formation of the company amounted to 22.1 percent of the total capital expenditure to the end of 1908. This was a very high proportion reflecting the difficulties in Parliament. The capital cost of the power station was 33 percent and building the transmission system amounted to 41.4 percent. Calculated from ***Garcke's Manual 1910/11***, p.1033.

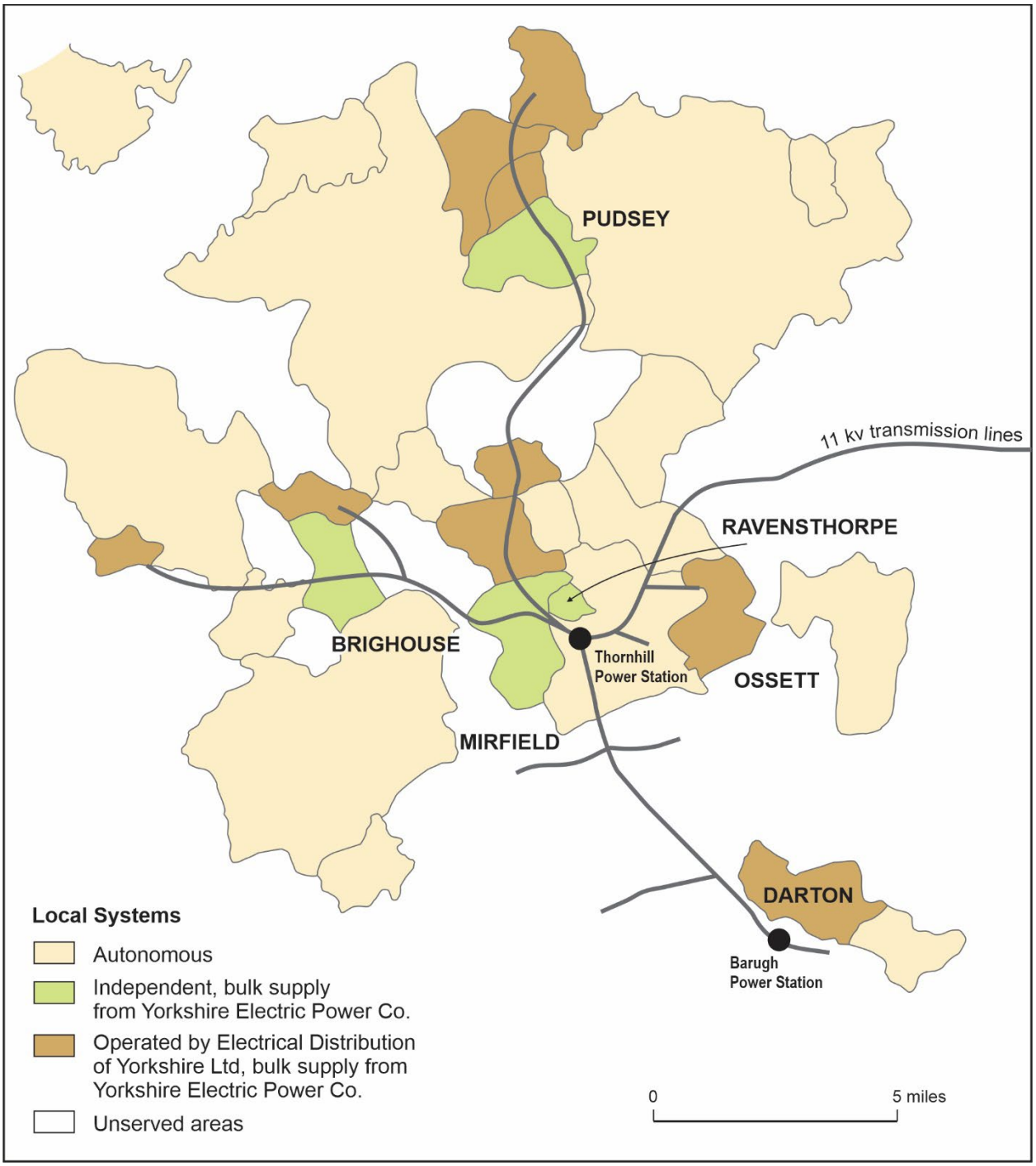

Figure 4 WEST YORKSHIRE; LOCAL SYSTEMS AND POWER COMPANY NETWORK 1912.

By 1912 the efforts of the Company had significantly modified the pattern of electricity supply in the region (**Figure 4**). There were now three types of local systems in West Yorkshire.

a) The 16 autonomous local systems remained. Some of the local authorities had extended their boundaries to take in adjacent urban districts. This was the case in Batley, Bradford, Dewsbury,

Leeds and Wakefield. Huddersfield had extended its supply area by the transfer of Electric Lighting Orders.[12]

b) A new group of four independent local systems had followed the opening of the Thornhill power station. Brighouse, Mirfield, Pudsey and Ravensthorpe (later incorporated in Dewsbury) had established local distribution systems and took bulk supply from the power company thus avoiding the capital costs of building generating stations.

c) As part of its expansion strategy, the Yorkshire Electric Power Co began acquiring Electric Lighting Orders by transfer from local authorities. A subsidiary company, Electrical Distribution of Yorkshire Ltd, was formed in 1905 to hold the lighting orders and to provide local electricity supply in the areas.[13] By 1912 there were nine of this type of local system in the region.

After 1912 a few more local authorities developed a local distribution system, in each case taking a bulk supply from a neighbour or the Yorkshire Electric Power Co.[14] Most of the unshaded areas on the map were gradually served by the Electrical Development of Yorkshire Ltd network. This expansion was completed by the early 1920s. Although the number of electricity undertakings continued to grow after 1904, none of the later formations built a generating station. This was one of the positive results from the development of the power company.

Problems resulting from the lack of inter-connection between the original autonomous local systems and with the power company became an issue from 1914 when wartime demands for industrial production brought increased electricity consumption. After the war there were various attempts to integrate the generating systems and consolidate the fragmented structure of supply areas. The completion of the national grid in 1934 linked all the major power stations but moves to consolidate the fragmented structure failed to achieve anything. The awkward relationships between the older local authority systems and the power company that inhibited consolidation persisted until nationalisation in 1948.

West Yorkshire exemplified most of the problems that affected almost all the industrial and urbanised parts of Britain. Although the technology was ready in December 1904 when Thornhill power station entered service, it was too late to change the existing structure of autonomous local supply areas. Developing a fully integrated system would take another forty years to achieve and required the full powers of the state to do so.

Undertakings

Local authorities and companies that owned and operated public electricity systems until 1 April 1948. Authorised undertakings were those operating under the Electric Lighting Act 1882 and subsequent legislation. Every undertaking required an Electric Lighting Order or Electricity Special Order (from 1920).

[12] The Electric Lighting Orders covered the small Urban Districts of Golcar, Linthwaite and South Crosland.

[13] Ossett Corporation leased the operating rights to the Electrical Distribution of Yorkshire Ltd but retained ownership of the Electric Lighting Order until nationalisation.

[14] New formations after 1912:
1914 Bingley
1915 Holmfirth
1924 New Mill/Slaithwaite
1927 Haworth

Non-statutory undertakings operated outside the legislation and were mostly in rural areas from World War I. Some early London companies and those in Reading and Southampton began as non-statutory operators. Many were later legitimised by the grant of an ELO/ESO.

Measurements

All measurements are in Imperial units as used at the time. The electricity supply industry converted to metric units in 1971/72.

Two adjustments to the original measurements have been made for clarity and later international comparisons. Kilowatt-hours (KWh) have been substituted for "units" (first introduced by the Board of Trade in 1882 and used in official statistics until the 1960s). The second change refers to AC frequencies, originally given as cycles per second, but changed here to "Hertz"or Hz. In 1925/26 there were 14 frequencies in use for generation, ranging from 25Hz to 100Hz.[15]

Years

Companies reported on a calendar year basis. Local authorities in England and Wales followed the financial year. Local authorities in Scotland had a financial year generally ending in mid-May.

Areas

Counties and other local authority areas (county boroughs, municipal boroughs, urban districts and rural districts) were those areas existing before the 1974 changes. Local government areas in Scotland were changed in 1975. An appendix, "Defining London" at the end of the London chapter, explains the local government structure of the metropolis.

Place names and spelling are those in use at the time of original publication.

Maps

Almost all the maps were specially compiled from the most reliable sources available for the time.

The map series c.1912 were based on the "Large map showing Electric Lighting, Power and Traction Undertakings in operation in the United Kingdom" (undated). Published as a supplement to ***Garcke's Manual of Electrical Undertakings*** Vol. XX.

Later maps of supply areas were derived from the Ordnance Survey Planning Map Series: Great Britain, Electricity Statutory Supply Areas 1:625,000 (2 sheets), 1946. These are online at the National Library of Scotland: Map Images.

Sources

Generally presented as footnotes to the text. All the major tables follow the same pattern and use identical sources and are therefore comparable from region to region.

[15] Electricity Commissioners, ***Engineering and Financial Statistics 1925/26*** (London: HMSO, 1926), Table 5, p.xlii.

A Personal Note

This has been a retirement project somewhat separate from a long professional life as a geographer in Britain, New Zealand and Canada. It began in a modest way in 2005 when, driving on the M6 from Manchester to Lancaster, north of Garstang, I noted how all the lines of communication are bundled together.[16] The bold towers of the Supergrid in this zone struck a chord. Why not look at the development of this major infrastructure project while visiting my father? A project like this would give us something to talk about and it would be a diversion from the tasks of supporting an aged parent. More visits to organise home care and then a hospice allowed a few opportunities to visit the University of Lancaster Library. The project had begun to take shape by December 2007 when my father died. A final trip to Britain in March/April 2008 to arrange sale of the house was combined with a little fieldwork among visits to friends and relations.

Taking up a study of electrification was more than a whim of the moment but had deeper roots. After decades of studying the automotive industry, I was ready for a change. By the early 2000s most of the features that I had researched were now empty ruins. As part of my studies at the University of Nottingham in the late 1950s I was familiar with the work of Eric Rawstron (1922-2016), one of the first geographers to study the British electricity supply industry.[17]

For my BA dissertation I had made a study of Limerick and had gathered material on the Shannon hydro-electric scheme and rural electrification. This had been supplemented with British publications. All these reports and maps had survived the moves around the world. Later reports on electricity in the British Isles, gathered when writing a series of books in New Zealand, reinforced the original collection.

Reflecting on the origins of my interest in electricity supply has brought back childhood memories. I am grateful to my parents for their patience in answering the questions about how things worked and incidentally taking me to places beyond the castles and cathedrals. By the age of ten I had some knowledge of the various types of lighting, traction, and power as well as a rudimentary sense of systems.

Like many of my generation I was brought up in a modern, semi-detached house with electricity and gas supplied by the local authority undertaking (Leeds Corporation). The house had all the electrical appliances of the time--various types of lighting, water-heating, electric fires, iron, toaster, vacuum cleaner, radio and telephone. Petrol rationing soon put an end to car rides. The Bramhope cottage of my father's uncle, that had only oil lamps and candles for lighting, was very different from my well-lit house. The Blackout was very constraining, especially in the winter. A trip to Morecambe in August 1945 was a magical experience, seeing the Promenade all lit up and watching the crowds enjoying a new freedom from the gloom and darkness.

Then we took a step backwards, moving from the leafy city suburbs to a village in a coal-mining district. For six months in 1947 we lived with only gas for cooking and lighting. It was a curious experience: the illumination was poor and lighting the delicate mantles was tricky when balancing the taper or match while holding the chain to open the gas supply.

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[16] See J.H. Appleton, ***The Geography of Communications in Great Britain*** (University of Hull Publications, London; Oxford University Press, 1962), pp.124-136. The Supergrid is noted on pp.228-229.

[17] See obituary, ***The Times***, 9 January 2017. Rawstron was an early academic user of ***Garcke's Manual***. See his paper: "The distribution and location of steam-driven power stations in Great Britain", ***Geography*** Vol.26(4), 1951, pp.249-262.

Most local travel in Leeds was by bus but sometimes we used the tram on the Meanwood route to town. The cars on this service were old, noisy, and uncomfortable and I watched the driver struggling with primitive hand-braking system. Experience with electric railways began with the Lancaster-Morecambe-Heysham system and gradually extended to the London Underground in 1947 and a year later to the Southport-Liverpool line and the fascinating Liverpool Overhead Railway with its superb views of the docks and the Mersey shipping. Experience of the smooth and quiet riding qualities of trolley buses came later in Nottingham and Auckland.

One of the earliest experiences of the power of the electric motor was a visit to my uncle's textile machinery works in Holbeck, Leeds, then producing parts for the Navy. With the click of the switch the whole machine shop came to life with the whirring line shafts, pulleys and belts all making a huge clatter. Many more factory visits followed over the years, later including electric arc steel furnaces in New Zealand on the day our twins were born.

Experience of the larger features of electricity supply systems came gradually. Power stations at Whitehall Road and Kirkstall, Leeds and at Lancaster were familiar from train Journeys to Morecambe. The large generating works at Ferrybridge was visible from car trips on the Great North Road. From 1952 to 1957 I watched the construction of the Wakefield B power station including the two large concrete cooling towers that came to dominate the landscape of that section of the Calder Valley. Later fieldwork included guided tours of Castle Donington and Ardnacrusha stations. Tours of the underground workings at Woolley and Bestwood collieries showed the hard and dangerous work of extracting the coal later used in the power plants.

A move to Arnside, Westmorland brought my first experience of a non-statutory operation with which Thomas Wilkinson had lit the lower part of the house from about 1910. The top floor had a different system installed by the Westmorland & District Electricity Supply Co. thirty years later.

Wirescapes first attracted my attention at Brierley in 1947 where two power lines passed close to our property. Early questions were: What did they do? What were they connecting? I soon learned that the large steel pylons were part of a line from Ferrybridge to the Barnsley area. Walking to school under these power lines was a strange experience in damp foggy conditions when the current leaking over the insulators gave rise to a crackling sound accompanied by little flashes of lightning. The lesser power line, with a different style of pylon[18], connected the power station at Frickley with other collieries in the district.

The changing signs and logos from the Yorkshire Electric Power Co. to the British Electricity Authority and from the Carlton Main Collieries Co. to the National Coal Board at this time reflected the big shift from private corporate systems to nationalised bodies. Change to the new order seemed to me uncomfortable and in a later school debate I gave a somewhat heated defence of the previous regime, not realising how fragmented it all was and how much in need of restructuring.

Living and working in New Zealand and Canada gave a wider perspective on the complex process of electrification. New Zealand had developed a state generating system with local authority distribution by 1920.[19] Ontario, with a provincial hydro-electric system had begun tapping the resources of Niagara

[18] The memory returned some sixty years later when I discovered they were the distinctive Kay poles named after C.W. Kay who designed these light tubular steel towers in 1911. See: R.M. Morgan, ***Callander's 1882-1945*** (Prescot: BICC 1982), pp.215,220.
[19] Helen Reilly, ***Connecting the Country: New Zealand's National Grid 1886-2007*** (Wellington: Steele Roberts, 2008), 376pp.

Falls a decade earlier.[20] Research for the ***Historical Atlas of Canada*** in the early 1980s gave much scope for the study of electrification.[21] The publication of ***Networks of Power*** [22] gave a wider appreciation of international developments in the use of electricity. British studies noted at this time included the work of Leslie Hannah[23] and D.G. Tucker.[24] All this experience provided a good base for the future website.

Work on the Supergrid project began in earnest during 2008. Enquiries from the BBC during preparations for a TV series, "The Secret Life of the National Grid"[25] led to writing several detailed research papers on the development of the national transmission system from the mid-1920s. This research on the grid highlighted the complexities of the fragmented electricity supply industry and led eventually to the creation of material for this website.

Two sources were essential foundations for this study. One was in Manchester where the Museum of Science and Industry had acquired the archival collection of the former Electricity Council. The collection included all the rare interwar publications of the Electricity Commissioners and the Central Electricity Board and, most importantly, a set of ***Garcke's Manual of Electrical Undertakings*** (1896-1960). The second source was close to home at The Annex[26] which held a bound set of ***The Engineer*** from the 1870s to the 1960s. Access to this rich resource gave new confidence in writing about past stages of electrification. The Annex collection proved to be even deeper with a great variety of British material.

Like many projects the initial focus changed and began to evolve into something more than the grid transmission system. The data were never quite complete, so more investigation followed, and more material accumulated. Some lines of enquiry seemed to lead to apparent dead ends and were abandoned. Taking up the website idea later often provided an opportunity to use seemingly redundant material. The prototype Area Study for the South Western Electricity Board Area (2014) seemed to offer a model for presenting research to potential users. Five years later the website idea was taken up by others and writing the chapters began in June 2019.

The enforced isolation and closure of libraries (from March 2020) during the covid pandemic helped the final research, writing and website design. During this period, I came to appreciate the benefits and the limitations of the electronic resources available on the Internet.

Working on this project has increased my respect and appreciation for the work of a past generation of librarians and archivists who patiently gathered materials for the new university libraries. In the present I am most grateful to Jan Hicks and her staff at the Museum of Science and Industry in Manchester for all the invaluable source materials copied for me. The Annex staff coordinated by Angie Davidson and later by Daniel Irvine offered a very supportive environment and shifted many tons of volumes on my

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[20] Neil B. Freeman, ***The Politics of Power: Ontario Hydro and its Government 1906-1975*** (Toronto: University of Toronto Press, 1976.

[21] Donald Kerr, Deryck W. Holdsworth and Susan L. Laskin, eds. ***Historical Atlas of Canada, Volume III: Addressing the Twentieth Century 1891-1961*** (Toronto: University of Toronto Press, 1990).

[22] Thomas P. Hughes, ***Networks of Power: Electrification in Western Society 1880-1930*** (Baltimore: Johns Hopkins University Press, 1983). The chapters on London and the North Eastern Electric Supply Co. (NESCO) are an invaluable record.

[23] ***Electricity before Nationalisation*** (London: Macmillan, 1979) and ***Engineers, Managers and Politicians: The first fifteen yars of Nationalised Electricity Supply in Britain*** (London: Macmillan, 1982).

[24] ***How Towns got Electric Light and Tramways: a case study of Gloucestershire and neighbouring towns*** (London: Science Museum, 1978) was a pioneer study at the local scale and described the process of applying for Electric Lighting Orders. Appreciation of Tucker's work and publication is noted in the Midlands Electricity Board Area chapter, p.32.

[25] Three episodes were broadcast in late 2010: "Wiring the Nation", "Switching On" and "Pulling the Plug".

[26] The Annex is a large warehouse in Guelph, owned by the Tri-University Group. It houses older, less used material from the University of Guelph, University of Waterloo, and Wilfrid Laurier University.

behalf. The print materials had so many advantages, including the interesting surprises missed by the indexes.

Marie, Guelph's Departmental cartographer, designed the website and finished all the maps and diagrams. Her demands for more copy helped to move things along. Andrew, with his service dogs Amy and Yukon, has been a wonderful companion and carrier on many library and photocopying excursions. Elizabeth has not only listened to the tales of non-statutory undertakings and the like but also edited the work and typed the manuscript on the long journey round the British Isles. All my love and thanks for 55 years of collaborative effort on a multiplicity of projects.

~ G.T. Bloomfield
5 September 2022