

Britain's Energy Networks in Transition: Coal, Railways and Electricity 1950-1970

Abstract: *This developmental paper explores the history of a rarely considered subject that become much more topical over the last year – how energy is distributed in the UK. Apart from the general paucity of material on the development of energy distribution in Business History, this paper also seeks to bring novelty in two new ways; Firstly, while sometimes rather dated histories of individual modes of distribution do exist, combining the histories of several together appears to rare to the point of non-existence. Yet while all energy modes are interconnected and affect one another, the existing histories appeared siloed. Secondly, this paper also attempts to re-construe railways as an energy distribution network rather than as a passenger or freight movement system. The symbiotic relationship of very early railways to coal is explicitly admitted to, but this relationship is progressively ignored from the early 20th century onwards. This paper argues that the construction of the national grid destroyed domestic coal consumption and localised power generation, and in doing so also destroyed the rationale for much of the rail network – particularly in rural areas.*

Introduction

This developmental paper intends to start a discussion about the history of energy distribution networks, specifically about electricity, and how its rise affected other distributional infrastructures that had preceded it. The dramatic rise in energy costs over 2021-22, the resultant major government intervention, and on-going instability in energy security provide pertinent backdrop to this investigation into the major change in energy infrastructure and distribution that occurred in Britain between 1950-70. Better explicating the blend of market forces and government policy that brought about the switch to electricity and the transformation in infrastructure at that time is not just a novel study in its own historical terms, but one that can offer valuable insights into the current predicament, not least by pointing out that rapid change in energy has occurred before and can be managed successfully. There can be lessons here for practitioners and policy makers as well as wider academic study.

However, whilst there are numerous and detailed histories of coal and railways in the UK (Church, 1986; Flinn and Stoker, 1984; Gourvish, 1985, 2002; Hatcher, 1993; Supple, 1987) it is surprisingly hard to find a systematic history of the development of electricity distribution and the national grid in the UK. The expansion of the system tends to be glossed over as prelude to privatisation, and while privatisation post the 1980s is explored and evaluated in considerable detail (Surrey, 2013) the formation of the physical structure that made it all possible – the national grid – is typically only indirectly referred to (Hannah, 1979; 1982). It seems that little has been charted, let alone discussed, about the actual construction and formation of the national grid and what the consequences were. The key years are those between 1950 and 1970, but this paper provides a little background context going back to the inter-war period.

Background

This paper argues that the distribution of coal by railways ceased to be an entirely economic proposition during the First World War. The cost and system of freight distribution was controlled – and the regulated post-war - by the state to ensure that high value goods subsidised lower value ones to ensure universal supply. Coal was precisely such a commodity. This meant that the distribution of coal and its transportation had become a socialised rather than a commercial activity. We see this as a tacit acknowledgement that the railways had in some senses become an continual energy distribution network which could not be 'shut off' even if the activity was no longer profitable.

In the same period, Britain began centralising electricity production and distribution via the Central Electricity Board in 1936 and the National Grid in 1935. Though the grid was initially

regionally based and dispersed around major urban and industrial conurbations, the system was unified in 1937. Starting from a low base, electricity production quadrupled between 1926 and 1939. Domestic usage of electricity also grew rapidly, though it still only represented 25% of demand in 1938, as opposed to 55% used by industry.

The rise of the Grid, the fall of Domestic Coal and the closure of the railways

By 1950 domestic demand of electricity had grown to 33%, and by 1970 it had outstripped industrial demand (77 TWh to 72 TWh). As a source of direct domestic energy consumption, coal collapsed from 38 million tonnes p/a in 1950 to 20 million tonnes p/a in 1970. Over this period the three grids (132 kV from 1927, 275 kV from 1953 and 400 kV from 1965) that make up the national grid grew extensively, the latter 275 and 400kV systems to 2000km and 4000km respectively. This allowed distribution to quadruple from 15 to 60 Megawatts daily in just 20 years. Meanwhile the network of railways declined from roughly 18000 miles to 11000 miles in the same period. By charting this growth in detail in specific regions, we can explore the correlations between scale, scope, distribution and usage in energy and consider the impacts of policies on the distributional infrastructure in local, especially rural, economies. We suggest that the growth of electricity via 'turning on' the national grid allowed the railways to be 'turned off' as an energy supply of coal. This was especially noticeable in rural areas.

Grid Expansion, Coal Consumption and Railway Network 1950-1970:

Date	Railway Network Kilometers	Domestic Coal Consumption Annual Millions of Tonnes	Electricity Generation Annual TWh	Domestic Electricity Consumption Annual TWh	Grid Distribution Capacity MW
1950	31,336	38	51.47	14.91	15
1951	31,152	38	56.19	16.94	16.2
1952	31,022	37	58.40	16.87	17.7
1953	30,935	38	61.64	17.69	19.2
1954	30,821	39	68.57	19.08	20.5
1955	30,676	38	75.33	21.15	22.5
1956	30,618	38	81.92	23.76	24.6
1957	30,521	36	85.50	24.85	26.6
1958	30,333	37	92.69	28.23	28
1959	29,877	34	98.94	30.49	30
1960	29,562	36	116.96	35.27	31.8
1961	29,313	34	120.07	39.97	33.9
1962	28,117	34	132.77	47.63	37.2
1963	27,330	34	162.65	54.48	39.3
1964	25,735	29	170.95	54.41	39.9
1965	24,011	29	169.57	57.23	43.5
1966	22,082	27	175.38	59.81	46.2
1967	21,198	24	181.14	62.35	50
1968	20,080	24	193.56	66.66	53.5
1969	19,470	22	206.37	72.19	55.1
1970	18,989	20	215.67	77.04	60.5

Sources: Department for Business, Energy and Industrial Strategy: Historical Electricity Data 1920-2021, Coal Production 1853-2021; Department for Transport Rail Statistics, Table TSGB0601 (RAI0101)

Conclusions

This paper requires a great deal more detailed data looking at spread of the grid at a local level before detailed conclusions can be pin pointed and reliably evidenced. Extensive records exist at the National Archive, the National Grid and the Institute of Engineering and

Technology which would support such further study. However, this paper suggests that following trends are notable, interrelated and relatively unexplored:

- a. The rapid growth of electricity production, usage and network distribution.
- b. The rapid contraction of the railway network.
- c. The rapid fall in the domestic consumption of coal.

Naturally, there are other concurrent trends relevant to these events - the growth in the motorway network and car ownership for instance. However, these trends have already been well covered and are, in some ways, incomplete explanations. For example, the motorway network was only half complete in 1970 and far less dense than in Western Europe, yet all the significant railway cuts had already been made by this point. We think that the switch in energy distribution networks somewhat pre-dates both universal car ownership and the roads programme, and as such is a significant and under reported event in Business History.

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