1. Introduction

On 8 May 1946, the electricity supply industry in France was nationalised and Électricité de France (EDF) was established. In 1947, the Electricity Act nationalised the electricity supply industry in Britain, with 1 April 1948 being set as the ‘vesting’ date for the transfer of assets into central public ownership. In the United States, regulation rather than nationalisation was the chosen means of exercising increased social control over the electricity utilities, and this found its legislative expression in the Public Utility Holding Company Act of 1935. In all three economies either national (France, Britain) or regional/state-based (USA), vertically-integrated monopolies were established and sanctioned by these legislative acts. The ownership, regulation and structure of each nation’s electricity industry remained fundamentally unchanged throughout the almost 30 years of economic growth and low unemployment that followed the Second World War, that period being commonly referred to by economic historians as the Golden Age (1950–73) or *Les Trentes Glorieuses* (1945–75) (Fourastié, 1979; Crafts and Toniolo, 1996). Yet, as the Golden Age began to tarnish, as impure gold will, so too were questions raised about the durability of the monopolistic structure of the electricity supply industry and its continuance as a regulated or nationalised industry. The sources of such questioning differed in each country, as did each government’s response. In France, EDF was able to separate itself from the broad contingent of nationalised industries and was allowed to negotiate new contractual arrangements between itself and the French government. Until very recently (2005), EDF was able to remain wholly in public ownership and to retain its effective domestic national monopoly. In the United States, the 1978 Public Utility Regulatory Policies Act (PURPA) encouraged new independent electricity producers to enter individual state electricity markets, but it was not until the 1992 Energy Policy Act that official, federal encouragement was given to the liberalisation of electricity markets in the United States. In Britain, the 1989 Electricity Act was preceded by a substantial restructuring of the industry and followed by determined efforts to promote greater competition in the industry. The 1989 Act itself effected the privatisation of the electricity supply industry in England and Wales, with the privatisation of the industry in Scotland following in 1991. In each case the policy response was shaped significantly by the perception of the
industry’s performance during the Golden Age. To that extent, the ‘path
development’ weight of history hung heavily over this industry.

The development of the electricity supply industry in France, Britain and
the United States during and after the Golden Age is the dominant concern
of this book. The book is organised around five main political–economic
themes: security (Chapter 2); pricing (Chapter 4); investment (Chapter 5);
forms of ownership, and industrial and market structure (Chapter 6); with
the fifth theme being the early development of the European Coal and Steel
Community and the later efforts of the European Commission to promote
competition in national and transnational electricity markets in Europe
(Chapters 3 and 6). Electricity is of particular interest, not only because
of its centrality to energy policy as a transformer of the potential
energy of fuels into a flow of energy of such wide application, but also
because its physical characteristics present particularly interesting problems
for economists. Travelling at the speed of light and substantially incapable
of being stored, its peak demand determines the industry’s maximum capac-
ity requirement and hence the industry’s large, lumpy, sunk investments.
In turn, its investments in transmission and distribution enjoy longevity and
the large sunk costs of the transmission network contribute to its commonly
being characterised as a natural monopoly. It was from either side of this
natural monopoly that nationalising and regulating governments extended
outwards to embrace the entire industry as a national and state/regional
monopoly.

This blurring of the distinctions between the national/state monopoly
and the industry’s natural monopoly component provided an important
target for the industry’s critics, to whom politicians more readily lent an ear
as the Golden Age lost its lustre (Gray, 1940). In particular, it was micro-
economists who attracted political attention towards the end of the Golden
Age, to some extent displacing in political affection the macroeconomists
who were more readily associated with much of the Golden Age. Quite why
fashions in the use of economists change is one of the running concerns of
this book. What is it that affects the willingness of politicians to listen to
economists and their often long-standing ideas? Why did work on utility by
Jules Dupuit, dating back to the 1840s, and what we now, post-Marshall,
term the ‘consumers’ surplus’ become of such renewed and particular inter-
est to economists during the 1970s, and through them to politicians? Why
does the same economic idea gain a foothold in one country but not, until
much later, in another? Why, to emphasise the central continuous theme of
this book, was the marginalist approach to pricing and investment in the
electricity supply industry adopted in France at least two decades before its
partial adoption in Britain and the United States? Much more will be said
on what is dubbed the ‘marginalist’ approach’ in Chapter 4, but it is worth
noting the considerable interest in marginalist theory among electricity managers and engineers in the early post-war years. International conferences on marginalist approaches to pricing in particular were held in Brussels, Louvain, Cologne and elsewhere (FONT, 1952, 1956). Such ideas were later to be evangelised in the United States by Cornell’s Professor of Political Economy, Alfred Kahn, in his 1970–71 two-volume book, *The Economics of Regulation*. While advancing the case for marginal-cost pricing so as to reflect the social opportunity cost of resource use at the margin, Kahn acknowledged his debt to previous generations of economists, and in particular to the earlier post-war work done by the likes of Marcel Boiteux at EDF.

So far, we have noted the essentially similar technical characteristics of electricity supply and the apparent common mid-century political willingness in each country to sanction the organisation of the electricity supply industry in a vertically integrated monopoly form (FONT, 1948, 1949). Yet, in comparing the electricity supply industries in France, Britain and the United States, we are comparing industries of contrasting size, ownership and organisational structure. To begin with size: in terms of the total production of electricity, the ratio in 1950 between the USA, the UK and France was 11.8:2:1 and in 1970, 11.7:1.8:1 (see Appendix Table A1.1). In 1950 the ratio of per capita consumption of electricity in the United States, the UK, and France was 3.2:1.6:1, and by 1974, 2.7:1.4:1. There were also significant differences in the forms of electricity generation. In the early post-Second World War period, a higher proportion than now of electricity was generated from hydroelectric, as opposed to thermal, sources. That the proportionate contribution of hydroelectricity should fall is not surprising, given that relative fuel prices fell and that the industry itself was likely to hit diminishing returns as the best sites were used first. None the less its contribution was important and nowhere more so than in France, where it contributed 48.7 per cent of national electricity production in 1950 and 31.5 per cent in 1974. In Britain, hydroelectricity output was never important, but in the United States its contribution to total electricity output was 25.9 per cent in 1950 and 15.6 per cent in 1974 (see Appendix Table A1.2).

So just before its great leap forward into a nuclear programme, in 1974 France still derived roughly just under one-third of its electricity output from hydroelectric sources and just under two-thirds from thermal-based generation. In 1978, this compared with 85.9 per cent in the UK where thermal sources had always been important (97.8 per cent in 1950) and 78.7 per cent in 1974 in the United States. This was little changed from 74.1 per cent in 1950, although in the intervening years thermal generators’ share had risen (to 83.4 per cent by 1970) before being displaced at the margin by nuclear power.
A further source of continuing variety lay in the primary energy base of each economy (see Appendix Table A1.3). However, these national statistics need to be read in conjunction with those of each economy’s exports and imports of primary energy (see Appendix Table A1.4). Not only did the United States always have a more balanced primary fuel base with coal, oil and gas all making significant contributions in contrast to the coal-based early fuel endowments of France and Britain, but the United States was also consistently more self-sufficient than the UK or France. In 1950, US primary energy imports formed 5.6 per cent of total primary energy production and only 13.15 per cent in 1970. The corresponding share for the UK was 13 per cent in 1950 and 107.4 per cent in 1970, and for France 64 per cent in 1950 and 295.7 per cent in 1970. This rise in fuel imports in France and Britain reflected the shift from coal to oil during the Golden Age, the comparative fuel poverty of France, and the intensification of its fuel dependency, which provided much of the background to the decisive shift towards nuclear power from the mid-1970s (see Chapters 2 and 5).

As well as contrasting in size, forms of generation and fuel base, there was also an obvious contrast between the publicly owned, nationalised electricity industries in France and Britain and the largely private, investor-owned utilities in the United States. However, both this contrast which was stark by 1948, as well as the similarities between the nationalised electricity monopolies of France and Britain, requires nuancing. Previously, the contrasts and similarities had been less clear. In the United States, as in Britain, there was a significant history of municipal involvement in electricity supply such that at its peak in 1921 there were 2,581 municipal systems. However, many of these systems were usually small, accounting for 41 per cent of all electric systems, but generating only 4.7 per cent of the total power output. Many of these small town systems were to be sold to private companies during the consolidation movement of the 1920s. Even so, the idea of municipalisation was still alive, and even reviving in the 1930s, as cheap loans from the federal government allowed local communities to buy their own electric system. From 1933 to 1938, the federal government paid approximately 45 per cent of the total cost of approved municipal projects and provided low-cost loans for the remaining 55 per cent as part of its public works programme (Joskow and Schmalensee, 1983, p. 17; Phillips, 1984, pp. 559–60; Millward, 2005, p. 77). While, in general, the municipal influence remained larger and stronger in Britain than in the United States, again this was in sharp contrast to France, where municipalisation was virtually unknown, much greater use being made of the concession system (ibid.).

While constitutional constraints affecting the division of power between the federal government and the states were always likely to make the nationalisation of the electricity supply industry in the United States
improbable, the 1930s did see considerable direct federal government involvement in the industry. Most famously, there was the establishment of the Tennessee Valley Authority (TVA) which represented a greater direct involvement by central government in the electricity supply industry than was the case in Britain. While the British government had promoted the construction of the national grid from 1927, it had made a virtue of the fact that it did so without requiring a change of ownership, but rather ‘the partial subordination of vested interests in generation’ (Hannah, 1979, p. 94). However, the overseeing Central Electricity Board was given power in the establishing Electricity (Supply) Act of 1926 to close down inefficient stations (Hannah, 1979, pp. 94, 113). State involvement in the promotion of interconnection and the construction of a national grid was also advanced in France by supporters of the nationalisation of the industry, although by 1930 there were already some 4,000 km of high-tension transmission lines in France, more in per capita terms than in Britain where almost one-third of the lines were also less than 70 kV. However, the integrated nature of the British grid gave it a distinct advantage in transmitting the benefits of lower-cost electricity over that in France, which seemed to wait until Paris was fully connected before embarking seriously upon the promotion of a national network (Beltran and Picard, 1987; Millward, 2005, pp. 128–9). Yet lest British-focused historians be tempted to wave the development of their integrated system eastwards across the Channel, they would do well to look westwards over the Atlantic. While the United States did not develop a national grid in this period, in 1923 the electrical output of Britain was roughly the same as that of the state of California, and Britain’s level of interconnection was inferior to a Californian network which stretched from one end of the state to the other (Hughes, 1983, p. 9).

In the United States, the preferred route to greater security of supply and increased efficiency by means of improving the system load was to be through the use of regional reliability councils, interconnections and power pools.

That the interconnection of the electricity supply system in the United States was left mainly to a process of organic state- and regional-based development, rather than encouraged from above by central government as in Britain and France, highlights a third point of contrast between the industries in each country. The essentially state-based development of the industry in the United States was in sharp contrast to its increasingly national development in France and Britain. In an industry characterised by its organic development out of towns, cities and regions, the constitutional integrity of state-contained electricity which was not traded across state lines allied to the regional development of interconnection, maintained a strong state-based character to electricity supply in the
United States. This essentially state-based system was only strengthened by the Public Utilities Holding Company Act of 1935. Reflecting concern with holding company abuses and coming in the wake of some spectacular crashes, such as that of Samuel Insull’s holding company empire, Middle West Utilities, the eventual Public Utilities Holding Company Act of 1935 required that holding companies be reduced to physically integrated systems, dealing solely with gas and electricity (Gordon, 1982, p. 95). This form of regulation had a number of important effects. First, it consolidated regulation (at state level) as the main form of utility supervision. Second, it effectively froze the structure of the industry in a series of regional monopolies (Newbery, 1999, p. 23). Third, it shifted investment risks towards customers, for so long as the regulator deemed the investment to be prudent and reasonable. Local monopoly vertically-integrated investor-owned utilities were effectively offered guaranteed rates of return on capital investment. The costs of poor investment decisions would be borne by customers, while in conditions of excess capacity prices would continue to reflect the return on asset base rather than potential excess supply (Hunt, 2002, p. 29).

Thus it was that at the beginning of the post-Second World War period, the electricity supply industries in Britain, France and the United States were structured as monopolies at either a national or state/regional level. This was politically tolerable so long as the industry was able to exploit economies of scale and technological progress to meet the 7 per cent annual growth in demand for electricity during the Golden Age, and to do so while maintaining price stability. In fact, as higher demand brought forth technologically advanced investment which was also able to exploit economies of scale, so unit costs fell, profit margins widened and price stability was ensured. It was only when this virtuous circle turned vicious from the end of the 1960s that the Golden Age assumptions concerning the ownership, regulation and structure of the electricity industry came to be challenged. The policy response in each country was shaped by the perception of how the industry had performed during the Golden Age. It is with that performance that this book is partly concerned. As a work of history, much of the book concentrates on the period for which the archives were open under the 30-year rule. The use of archival material is confined to the study of France and Britain, for no other reason than the sheer exigencies of time and energy. Time and energy themselves feature large in this book, which, while most obviously seeking to analyse the post-Second World War development of energy policy in each economy, also has a particular concern to trace and underline the importance of the marginalist approach to the allocation of resources in and among the fuel and power industries of Britain, France and the United States.