

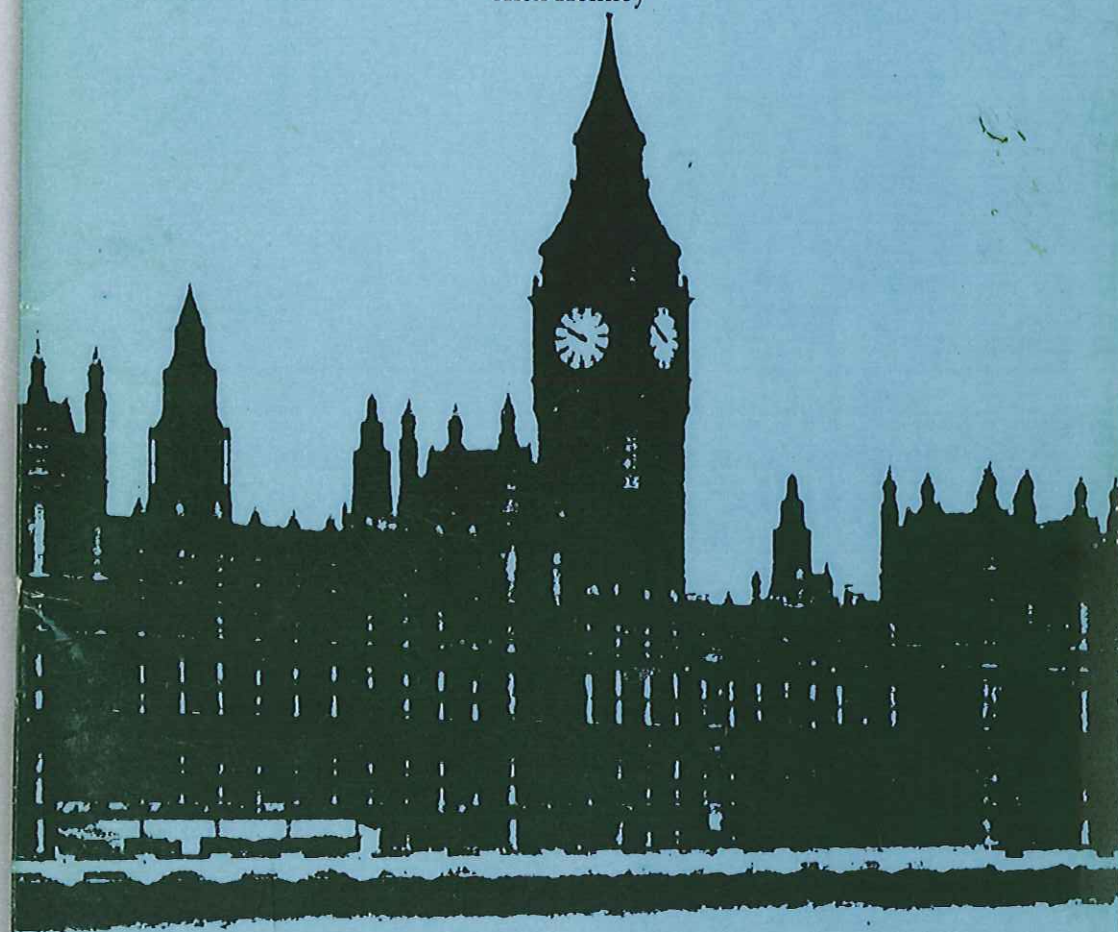


Policy Study No. 83

Privatise Power

restructuring the electricity supply industry

Alex Henney



CENTRE FOR POLICY STUDIES



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8 Wilfred Street, London SW1E 6PL
1987

Acknowledgements

The work underlying this report was made possible by the support of Simon Webley, Chairman of the Trustees of the Institute for Policy Research. It was converted from scrawl to script by the extraordinary competence of Hilary West.

Many people in the United States gave generously of their time and hospitality, helping me to understand their electric power systems, and how power could be structured in a competitive way. In particular I would like to thank Mr Paul Levy, Chairman of the Massachusetts Public Services Department; Professors Fred Schweppe, Richard Tabor and Richard Schmalensee of the Massachusetts Institute of Technology; Professor Richard Bohm of the Harvard Business School; Mr Christopher Turner of the Niagara Mohawk Power Company; Dr Miles Bidwell, Vice President of the National Economic Research Associates; and Mr Guy Nicholls of the New England Electric Power System. In the United Kingdom, particularly within the Centre for Policy Studies, those who have helped me unstintingly are too numerous to mention.

Support towards research for this study was generously provided by the Institute for Policy Research.

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ISBN 1-870265-03-3

© Centre for Policy Studies March 1987

Printed in England by G. Donald & Co. Osiers Road, London, SW18

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This pamphlet is a short version of a 60,000 word thesis on the restructuring of the Electricity Supply Industry written by Alex Henney. The complete version will become available in typescript under the title 'Privatise Power: the full study' for £35.

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Preface

Britain's Electricity Supply Industry is on the verge of a programme of heavy capital expenditure, to fill a supply gap forecast to widen rapidly in the early years of the next decade. This gap is a consequence partly of vigorous growth in the economy and partly of the forthcoming retirement of generating plant constructed in the extraordinary round of activity in the late 1950s and 1960s. The onset of this programme will be marked by the closure of the nine Magnox nuclear stations during the 1990s.

Belief that the ESI should be restructured will command general assent – if only because there is no good reason why the enormous expenditure which is planned should be a claim on the public purse. The way in which it is restructured, and the extent to which the industry will be exposed to market forces, will profoundly affect the efficiency of the new system which must serve our economy in the first quarter of the next century. The stakes are high. The net assets of the ESI are some £36 billion; well over twice those of British Gas. Electricity demand has been growing at a vigorous 2.5% a year since the economic recovery began in 1981. An economy which is likely to be orientated more and more towards service and high-technology industries may well become more and more greedy for electricity. (And the environmental questions are as difficult as the economic ones: what should we do about nuclear waste, nuclear safety, acid rain from coal-fired power stations, the growing concern of scientists about the 'greenhouse effect' caused by the combustion of fossil fuels?)

It is, then, timely to propose policies for restructuring the ESI which will encourage enterprise, competition, efficiency. For too long it has been taken for granted that in our densely-populated island the advantages of a large-scale, integrated system – of a monolithic ESI – are overwhelming. But is the ideal model of an efficient system one which comprises a small number of very large power stations, linked by a national grid, and operated in accordance with an 'economic merit order'? Or can there be some other solution, or set of solutions?

Alex Henney is proposing a scheme whereby about ten generating companies, heirs of the CEGB, would be in genuine

competition with one another. Genuine, because they would all start from the same point, each possessing a mixed bag of oil, gas and coal-fired plant, geographically dispersed to avoid any dangers of creating regional monopolies. Electricity distribution, on the other hand, may be that awkward and rare animal – a natural monopoly. Alex Henney's scheme of subjecting distribution companies (based on the present area boards) to a strict regime which gives them an interest, as well as a duty, to buy from generating companies as cheaply as possible, deserves careful scrutiny.

These companies would mutually own a new transmission and control company, responsible for developing and maintaining the national grid, and acting as a common carrier. Finally an Electricity Commission, learning from the American experience, would insist upon competition, provide a framework for a forward market in power, and rule upon matters of public interest.

The criticisms which in the first part of the pamphlet the author makes of the various sectors of the electricity supply industry reflect his belief that the temptation is irresistible for any monopoly to make life as secure and comfortable as possible for itself. Had there been competitive forces at work in the industry over the past decades, would prices of electricity have remained about a fifth higher than they need have been? And, had power been cheaper, how many benefits would have flowed for all British industry – and domestic consumers? It is for these reasons only that the author has thought it worth while to identify the shortcomings of the ESI. The costs of the inefficiency of nationalised concerns – which British industry has directly to bear – are very high indeed. The price of coal paid by the ESI, a subject to which the Centre hopes to return, is a case in point. Here is inefficiency piled upon inefficiency, cost upon cost. If the consumers are to benefit fully from the restructuring of the ESI, the opportunity must be taken to introduce, wherever possible, the tonic disciplines of the market-place.

DIRECTOR OF PUBLICATIONS

Introduction

The present Government has succeeded in privatising two major utilities, British Telecom and British Gas – but only as largely integrated monopolies. There was doubt whether such large flotations could be achieved, and it was thought there was no time to restructure them in a way which would open them to competition.

The case for so restructuring the electricity supply industry of England and Wales (ESI) might, perhaps, be less powerful if it was operating efficiently. Chapter 2 shows that it is not. The Central Electricity Generating Board (CEGB) is forced to buy expensive British coal. Its policies for the ordering of plant seem to be dictated not by commercial considerations but by the political interplay of vested interests. Enormous overruns in time and cost have been incurred in the construction of both nuclear and fossil-fired installations. Area boards have performed patchily; scope for improving efficiency and reducing costs is evident both in their main business of electricity distribution, and in their retailing operations. Although the South of Scotland Electricity Board (SSEB) performs marginally better than the rest of the ESI many of the same shortcomings are evident.

Overall the performance of the ESI compares poorly with that of British Gas and very poorly with electricity industries in other parts of the world, notably in Germany, France, US and Japan. Indeed productivity in the Japanese industry appears to be *twice* that of ours. Concomitantly, the pay of employees of the ESI is higher than the national average of workers in manufacturing industry. All this suggests that the industry is run not with an eye to net consumer benefit, but in accordance with its own interests which it pursues with little accountability and great secrecy.

Chapter 3 rehearses the lessons to be gained from the experience of West Germany, Sweden and the United States, in all of which countries electricity supply is fragmented, with varying degrees of private ownership. The German industry which is about a quarter as large again as the ESI, comprises some 940 separate undertakings (300 in generating and transmission,

640 in distribution). Yet their industry is more efficient than ours and, save for the compulsion to buy German coal, is less politically manipulated.

The Swedish industry, which is about one third of the size of the ESI, is very diverse. A State power company generates half the total power and owns the transmission grid. Other companies are owned municipally, others privately. Although the system is coordinated by central despatch of generating plant a market operates in long term and spot power, in transmission capacity, in the assets of generation facilities and in the assets and franchises of distribution companies. Government involvement in the industry is not large.

The industry in the United States is ten times larger than the ESI – and is also very diverse. Private utilities, regulated by public service commissions, predominate. Much thought is now being given to developing the ideas for promotion of competitive power, and wholesale power markets are now emerging in some parts of the country (for example, in California and Texas some 7,000 MW capacity in Combined Heat and Power schemes (CHP) has been brought on line this decade). Conscious of the uncertainty of demand and of fuel prices, and of the financial problems inherent in constructing large power stations, utilities are adopting a flexible and 'portfolio' approach to providing their generating capability. New technologies are being tried in large-scale plants, and an emphasis is being laid on a modular approach – that is, ordering plant which can be built in three or four years and added in smaller increments than is possible for large nuclear and fossil-fuel plants.

Evidence in this report shows that customers are getting a poor financial deal from the ESI. Electricity prices are about a fifth more than they should be. Much of this is due to uncompetitive purchasing of fuel, plant and other services; much due to overmanning and overpayment of employees.

In considering how to restructure the ESI, we should leave to one side the historical reasons *why* the industry has been organised in the way that it has been. Once, electricity companies needed to be integrated monopolies if they were to aggregate demand in order to build up loads to support large and efficient generating plant and to gain the benefits of 'system economies'. These benefits can now be achieved through the national control centre and the national grid which allows the despatch of the sets in economic merit order. It can be argued that distribution and transmission are more or less natural monopolies. But

generation? Experience shows that size no longer equates with efficiency. Just as computing in the 1970s moved away from monster main-frame machines to dispersed networks of smaller machines, and just as in the 1980s new printing technology has allowed new newspapers to flourish, so in the 1990s electric power systems should cease to be wholly dependent upon large, centralised generating sets owned by large, integrated utilities.

The overriding aim must be to improve the industry's efficiency and its responsiveness to the customers' needs, in order to help British industry to improve its competitiveness in world markets and to provide domestic customers with the cheapest power possible. This can be done if we:-

- introduce private capital so that the industry is less at the mercy of political and bureaucratic influences;
- make generation competitive by encouraging diverse ownership; and
- create distribution companies as a countervailing force to generating companies, a relationship analogous to that between supermarkets and food manufacturers.

The second and third objectives will be lost if the industry is either privatised intact or as separate regional power boards. A group of medium-sized monopolies with broadly similar interests is much the same animal as a large national monopoly. Both such courses would (in the words of the 1983 Conservative Party manifesto) 'merely replace a State monopoly with a private one, and would waste an historic opportunity to ensure that it did not exploit its position to the detriment of customers'. Rather, the industry should be restructured and privatised by creating:-

- (say) 10 generating companies each owning a portfolio of coal, oil and gas generating capacity with generators of roughly equal fuel type, age and size. If competition is to be effective it is of the first importance that such companies should be geographically dispersed and balanced. They should enter into long, medium and short term contracts with
- distribution companies based on the present Area Boards. These might be sold either in a form similar to the private statutory water companies, or as plcs. They should be subject to a price regime which provides an incentive both to reduce their added costs, and to buy power competitively.
- A transmission and control company (TRANCON) which would be owned on a mutual basis by the distribution companies. TRANCON would own the grid, despatch control and the two large pumped storage plants. It would despatch

- the sets in merit order, implement a spot market in power, schedule maintenance and develop the transmission system.
- An Electricity Commission which would regulate the distribution companies and TRANCON, promote competition wherever possible and (like Lloyd's and the Stock Exchange) create and regulate a physical commodity market in power – and possibly a futures market, too.
 - A nuclear rump (*sic*). This might well have to remain in 'public ownership' for the present. But some plants might in the future be offered for sale by private treaty or management buy-out.
 - The South of Scotland Electricity Board (SSEB) should be privatised as a power board together with regulatory checks to ensure that it does not abuse its monopoly position. Given sufficient information available from England on competitive power prices and comparative distribution costs this should not prove too difficult.

These proposals are based on experience, open for all to examine, in the USA and elsewhere. Separate generation and distribution companies; a diversity of fully integrated power pools which despatch units, schedule their maintenance and generally provide a measure of coordinated planning for the companies; long and short term contracts for power – all these *modi operandi* exist in the USA. Already, too, there exist or are emerging markets in spot and long term power.

Now is the time to restructure the ESI in order to make it the most efficient electricity supply industry in the world. Chapter 5 suggests how this should be done. Those who need no persuading of the inadequacies of the present arrangements should proceed directly thither.

Operational efficiency

The operating cost structure of the ESI in 1985/86 was as follows¹

	£m	%
Generation and transmission		
fuel and purchase of electricity	4734	48.7
salaries and related costs	764	7.9
depreciation	958	9.9
rates	179	1.8
other purchases and services	759	7.8
TOTAL GENERATION AND TRANSMISSION COSTS	7394	76.1

Distribution		
salaries and related costs	699	7.2
depreciation	498	5.1
rates	183	1.9
other purchases and services	385	3.9
TOTAL DISTRIBUTION COSTS	1765	18.1

TOTAL TRADING COSTS	9159	94.2
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interest and monetary working capital adjustment	559	5.8
TOTAL COSTS	9718	100.0

These figures illustrate the dominance of generation costs – 82% of the total (if adjustments are made for interest and monetary working capital). Within generation they show the importance of fuel costs, comprising about 50% of the total.

This chapter first examines fuel costs, then the CEGB's plant construction performance which accounts for the major part of the depreciation and interest costs amounting to 15% of total cost. Next it looks at the CEGB's labour productivity. Finally it scrutinises the performance of Area Boards, the Electricity Council and the SSEB.

Coal has always been the major source of energy for generation. It remains so. In 1985/86 generators driven by coal supplied about 80% of the CEGB's output, by nuclear about 17% and by oil and gas about 4%. The cost of coal (£3,681m in 1985/86)

represents 40% of the industry's trading costs and 37% of the final price of electricity². In recent years the price paid for coal by the CEBG has been based upon a 'Joint Understanding', originally agreed in October 1979, which committed the CEBG to take not less than 95% of its annual tonnage from British Coal. According to the Monopolies and Mergers Commission, the delivered cost of coal imports in the summer of 1980 was only two thirds of that from British Coal.³ And during the winter of 1985/86 the price which the SSEB paid for coal from British Coal was a third more than the price paid either for coal mined privately in Scotland or imported.⁴ In 1985/86 the average delivered cost of coal to the CEBG was £47 per tonne and the pure energy cost for coal-fired electricity averaged about 2.08p kWh. In comparison, in September 1986, the average cost of coal of similar calorific value delivered to the Virginia Electric and Power Company (VEPCO) was \$32.4 (say £22.3 per tonne – at £1 equals \$1.45) and the pure energy cost per kWh for coal-fired electricity averaged 1.68 cents – equivalent to about 1.16p. That is almost half the CEBG's cost. Certainly, VEPCO is fortunate to be close to a source of cheap coal. But the difference between the price that it pays and the world market one is not so great as to justify these figures.

In recent evidence to the Select Committee on Energy⁵ the CEBG claimed that over the period 1982-85 coal from British Coal 'has cost the Board between £5 and £16 per tonne on average more than the published international price. Put another way, imported coal has offered potential savings of between 12% and 38% percent against the average price of coal from British Coal . . . each £1 per tonne change in the average price is equivalent to almost 1% change in the average price of electricity'. As the CEBG commented 'British Coal has for many years benefited from the protection by successive governments reflected in the levels of subsidy paid by the Exchequer and in other measures such as government policies with regard to the import of coal . . . British Coal has assumed in crude terms that the market would absorb all the coal it wishes to produce, and that the CEBG as by far the largest customer will by one means or another be forced to take most of whatever coal cannot be disposed of elsewhere.'⁵ The CEBG claimed that it was subsidising British Coal by £1bn annually and that some £550m annually could be saved by

importing 30 million tonnes of coal. In June 1986 the 'Joint Understanding' was revised into a three tranche price structure. The pit-head price for the first fifty million tonnes is £46.8 per tonne; the price for the second tranche of 12 million tonnes at £33 per tonne is aligned to oil prices; and the price of the third tranche, supposedly aligned to the price of spot coal landed at the Thames was set at £29.50 per tonne. This agreement has reduced the price the CEBG pays for coal by £300 million* per annum initially and will reduce it by a further £140 million annually by the end of five years.

How does this square with the CEBG's statement that it has a 'firm intention of buying supplies at internationally competitive prices'?⁶ By no stretch of language is the relationship between the CEBG and British Coal on a 'straightforward commercial basis'. No strict commercial organisation would commit itself to buying 95% of its coal at an average price of £43 per tonne when the spot market price is about \$35, or about £23-£25. The CEBG should be buying at an average of £30 – £33 per tonne; in effect it has left £7-£900 million on the table.

The CEBG has similar relaxed and non-commercial relationships with British Rail, which moves two thirds of its coal, equivalent to about a third of BR's total freight tonnage. In 1976 the board signed an agreement with BR whereby it undertook to 'forgo the use of road support for coal supplies from rail-connected sources to rail-connected power stations'. It agreed charges linked to inflation which did not allow any productivity improvement by BR to be shared by the CEBG. During the miners' strike the CEBG used road transport heavily and found that it was 'about 30% cheaper.'⁵ (Fortunately this agreement has recently been modified.) In a similar way the agreement between the CEBG and BNFL to reprocess Magnox fuel allows a public monopoly supplier to pass on cost to a public monopsonist purchaser. The MMC found the CEBG did not know the basis of these costs; did not know why they had risen threefold in real terms between 1975 and 1980; and did not know why they were forecast to increase a further threefold by 1987.³

* To offset British Coal's loss of £300m income the Government increased the amount it wanted from the ESI by the same amount. It tightened the negative EFL, the cash limit on the industry, from £1128 in 1985/86 to £1406m in 1986/87, a change which was coincidentally about £300m.

Construction of plant

The Herbert Enquiry in 1956 was the first, among a series of reports which spanned a quarter of a century, to draw attention to the poor performance of the CEBG in constructing plant. The National Board for Prices and Incomes examined delays in commissioning plant in 1968 and was followed in 1969 by a Committee of Inquiry into commissioning CEBG power stations. In 1970 the National Economic Development Office (NEDO) working party on large industrial sites reported unfavourably on problems of power stations. So did the 1976 NEDO working party on engineering construction performance. Foreign construction, NEDO found, was cheaper and quicker.

Then the Plowden Committee in 1976⁷ criticised construction performance, and the Price Commission followed suit in 1979. It found that the delays and cost increases were continuing. The reasons were familiar. Industrial relations on site were bad, productivity was low, and equipment was being redesigned in the course of construction.

In 1981 both the Select Committee on Energy⁸ and the MMC were similarly critical. The Select Committee examined the problems of low productivity and industrial conflict in the building of the Isle of Grain oil-fired power station, which was a third over budget and four years behind time schedule. The Committee concluded that 'the CEBG must, in our view, be blamed for their reluctance and inability for so long to assert firm management and to promote and increase productivity.' At the same time the MMC concluded that 'in recent years the backlog of commissioning appears to have been getting worse in relative, as well as absolute, terms'. The five conventional stations then under construction were expected to be delayed from two to three years (which has subsequently increased from three to six years) and to overrun costs in real terms by 19%. The MMC further found that the average overrun of costs on CEBG's advanced gas-cooled reactor stations was just over 100% in real terms; and that compared with planned completion of six years the forecast times were by then fifteen years. These have subsequently increased to nearly twenty years. In real terms Dungeness B cost at least two and a half times the original estimate and generates electricity at

4.66p per kWh, compared with about 2.5p for the first half of Drax, a recently commissioned coal station.

It is fair to add that plant construction has lately improved. Completion of the 1200 MW AGR Heysham 2 is forecast within eight years – half the time its predecessor took to construct – while the 2000 MW Drax B coal-fired station *was* completed in under eight years. None the less these improved performances are still modest. According to an OECD expert group⁹ it takes five to six years to build a large coal station in the rest of Europe at a cost of \$500-600 per kW as against \$950 per kW in Britain. Although it may be argued that some of the continental figures are optimistic and that the CEBG's are based on an outdated design, it remains to be seen whether its claims that future plant will be more competitive are valid.

For at least one decade (if not two) the CEBG's record in its plant ordering strategy has been poor. The MMC held that its forecasting was consistently over-optimistic, and, because plant was ordered to support loads which did not materialise, led to increased costs. Indeed the plant margin (that is, the capacity of the plant available over and above the maximum demand for power) peaked at 42% in 1975, almost double the operational requirement, and would have reached over 60% had the plant been completed on time. Three of the unnecessary stations were estimated to cost £2,500m. To make matters worse, in January 1978, the Government ordered ahead of requirement the 2,000 MW coal-fired Drax plant, then an advanced gas-cooled reactor (AGR) for the CEBG at Heysham, and another for the SSEB at Torness. The MMC considered that the CEBG's investment appraisal was based on optimistic assumptions, and did not pay proper regard to factors of risk and uncertainty. They said that its evaluation of the need to invest in plant 'represents a seriously inadequate treatment of problems of great magnitude and falls short of what one might expect to find . . . material on the planning background is potentially confusing . . . if the Board's costs are to be minimised, it is important that future projects should be assessed on more reliable economic grounds'.³

We now turn to management (or rather mismanagement) of the British nuclear power programme. In 1965, under political pressure from the United Kingdom Atomic Energy Authority

(UKAEA) and the then British nuclear power consortia, the CEBG conducted an enquiry which purported to show that the UKAEA's AGR design would produce electricity 7% more cheaply than the American Pressurised Water Reactor (PWR). The CEBG then ordered four AGRs (and the SSEB one). All ran over time and budget. In the 1970s the estimated requirement for nuclear plant fluctuated wildly, and the choice of system was altered three times. In August 1972 the then Chairman of the CEBG stated that the Board would need to order only two reactors by 1980 and at most eight afterwards. Sixteen months later in December 1973 he stated that the CEBG would like to order eighteen reactors by 1980, and a further eighteen thereafter. In 1979 (by which time the CEBG had actually ordered two) the Board persuaded the Government that it 'would need to order at least one new nuclear power station a year in the decade from 1928'.⁸ Only seven years later was an order placed. In 1974 the preferred choice of reactor system was changed from the AGR to the Steam Generating Heavy Water Reactor (SGHWR). But this preference lasted no more than two years, and in January 1978 development was abandoned and £145m of taxpayers' money was written off. Now some combination of AGRs and PWRs were thought to offer greater economic benefits. Subsequently the CEBG has backed the PWR, while the SSEB (whose former Chairman had once supported the SGHWR in favour of the AGR) has argued that the AGR is more efficient than the PWR.

The MMC observed that 'a large programme of investment in nuclear power stations is proposed on the basis of investment appraisals which are seriously defective and liable to mislead. We conclude that the Board's course of conduct in this regard operates against the public interest'.³ In plain language the board was juggling with the figures because it wanted to build nuclear power stations. Nuclear policy in Britain has never been founded on commercial logic and the interests of electricity customers. It has been dictated at various times by the pressures of the UKAEA; of the plant nuclear consortia (notably the General Electric Company); of nationalism versus Westinghouse; and of the Government wishing to find a counter to the power of the National Union of Mineworkers. The shifting policies have been

the result of lack of competent direction *within* the industry and the Department of Energy, and the vacillation of politicians.

Over thirty years the civil nuclear programme has produced nine Magnox reactors which the CEBG stopped building on the grounds of expense; lost several billion pounds on research, development and construction of the AGRs; lost about £300 million – today's prices – on the SGHWR; and spent about £3 billion – today's prices – on research into the fast breeder reactor which still shows no signs of commercial development.

Since its creation the CEBG has shown no wish to give serious consideration to alternatives to building very large generating sets owned by itself. It believes that big is beautiful and that bigger is more beautiful. In its evidence to the Sizewell Inquiry it ruled out smaller plant as uneconomic (an attitude which has resulted in British boards owning 57% of all the fossil fuelled generating sets of over 500 MW in the EC). It is of course true that larger sets do provide economies of scale, but only *provided that they operate to a full capacity and do not contribute to creating uneconomic plant surplus*. These provisos have not always been met. The large coal sets have operated erratically: the large oil sets have scarcely been used. And consequent over-capacity has incurred great costs over the last decade – which have been passed on to the customer.

In an uncertain world, where fuel prices fluctuate and electricity demand cannot be accurately predicted in the medium term (let alone the long term) a strategy of building only large units, which might result in lowest costs under *known* future conditions, is not necessarily the most economical policy. An approach which allows for uncertainty can be cheaper. This implies building a number of smaller plants which are quicker to construct, thereby reducing the risk of over-ordering on the one hand and plant shortage on the other. This is known in the United States as a modular approach.

Combined Heat and Power Schemes, and some new technologies

The two principal traditional alternatives to building large new plant are modernising old plant, and Combined Heat and Power schemes (CHP) linked either with district heating for housing or

with industrial processes. In its evidence to the Sizewell Inquiry the CEBG claimed that modernising small old plant was not economically viable. Yet this is a business which thrives in the United States. Although modernised plant may not quite match the thermal efficiency of a large new one, the savings in infrastructure and in time can often justify the exercise. The CEBG admits that CHP may be viable, yet a succession of reports over the last decade (including the Plowden Committee Report and two reports by the Select Committee on Energy) have shown how such competition to the CEBG's own supplies have been quashed. Before the Energy Act 1983 the ESI charged unduly high prices for interconnexion and metering, and paid unduly low prices for the purchase of electricity. (The Chairman of the Yorkshire Electricity Board recently admitted to the Energy Committee¹⁰ that the price offered to independent generators was a third lower than that now offered.) The passing of the Act left the ESI able to set the terms of trade offered to private generators. It made no provision for independent arbitration on general tariffs. Examination of the recent report by the Select Committee on Energy¹⁰ 'Combined Heat and Power: Lead City Schemes' shows how:-

- the structure of the Bulk Supply Tariff (BST) has been altered to reduce the purchase tariffs which the Area Boards have to pay to private generators under the Act;
- Area Boards have claimed that they are unable to sign long term contracts which include price provisions – an inability which undermines the financing of new schemes; and
- no information on system costs have been provided which would enable outsiders to judge the fairness in the terms of trade which they are offered.

The Committee concluded that 'the Energy Act has largely failed to stimulate the growth of CHP . . . if anything the industry has done less since 1983 than it achieved before'.

In its 1982 evidence to the Sizewell Inquiry 'On Alternative Methods of Generation' the CEBG dismissed technological alternatives to generating power other than CHP as either unproven or uneconomic, or at best belonging to tomorrow. For example it said of fluidised bed systems 'a first full-scale plant could be operating somewhere in the world during the early

1990s'. (A fluidised bed boiler comprises coal ground into small particles which are suspended in a vertical air flow. The particles form a bed or layer which is then ignited.) In fact, one commercial sized pilot unit of 125 MW started operating last year in the US, and two more are due to commence in 1987 and 1988.

Also the Stockholm Energy Company is installing one in a CHP plant.

Productivity

From 1965 to 1985 CEBG output (as measured by GWh supplied per employee) increased by 114%. But this figure cannot be taken at face value as representing an equivalent increase in labour productivity. Much of the improvement is due to an improvement in the quality of capital stock, notably the introduction of larger generating sets and phasing out of smaller, older sets. Over the last decade the CEBG reduced the number of generating sets by 44% and halved the number of power stations, but the number of employees has been reduced only by 25%. A recent OECD report⁹ shows that plant manning is still much higher than in foreign utilities.

Comparative power station manning

	<i>Manning for a 1200 MW PWR nuclear station</i>	<i>Manning for a 2000 MW coal station</i>
UK	555	844
Belgium	240	380
Canada	—	320
France	280	505
Germany	330	630
Italy	—	495
Japan	200	215
Netherlands	330	580
Sweden	330	500
US	401	490

Although these figures are not directly comparable because maintenance practices vary from country to country, the SSEB

confirms that 'manning levels in North American stations are significantly lower . . . the significant factor was the lower maintenance requirement of North American plant . . . a number of local understandings and working practices had developed within the Board's central maintenance team which have increased costs or inhibited flexibility . . . such as the refusal of employees to carry tools and other equipment in their private vehicles'.⁴

The MMC commented⁸ in 1981 that 'in recent years the rate of improvement [of the CEEB's performance] has slowed appreciably, while at the same time the CEEB's labour costs have been rising more rapidly than the national average. Over the period 1970/71 to 1979/80 while CEEB output per head grew by 13%, labour costs increased by 46% in real terms'.³

The MMC commented 'we detect some evidence of over grading and some obstructive attitudes to change'. They instanced that negotiations for the introduction of job evaluation had been going on for six years with no conclusion. Subsequently the CEEB did improve output per head by 35% over the five years 1980/1981 to 1985/1986. But the trend of increased labour costs is continuing.

Area Board Performance

Although staffing was reduced by 12% over the last five years the real added cost per customer of the area boards, which is the best indicator of their performance, has increased by 3%. The table¹ opposite shows how varied is the Board's cost performance.

Costs of distribution depend upon customer density. The higher the density the lower the costs should be. What reasons can be given why the Midlands, North West and above all the Yorkshire and London boards, which are four of the five most dense ones, should have such high distribution costs? If all boards reduced their costs to those of the Eastern and Southern boards, both of which serve substantial areas of London, some £40m would be saved annually on distribution.

Nor does there seem any good reason for the wide variations in the customer-related costs. In 1982 Deloitte Haskins & Sells studied these costs in three boards (Eastern, North Western, and Midlands) and concluded that £31m annually would be saved in the latter two if they achieved the same level of

efficiency as the Eastern Board, which has long been recognised as the top performer.¹¹

Added costs/customer and employees/customer of the Area Boards

	Added costs/ customer in 1985/86 £	Reduction in employees/customer 1981/82 to 1985/86 %	Employees/ 1000 customers in 1985/86	Distribution Costs/ customer	Density of customers/ sq km	Customer related costs/ customer £
Eastern	60.6	4	2.68	42.2	136(6)	18.3
Southern	70.9	20	2.78	42.6	137(7)	21.0
South Eastern	71.5	12	2.86	40.4	244(2)	21.5
East Midlands	72.7	7	3.00	45.2	122(8)	23.5
North Western	77.5	14	3.23	48.0	161(4)	23.7
North Eastern	79.1	18	3.12	49.4	92(10)	25.10
Midlands	83.1	17	3.37	47.2	152(5)	24.9
Merseyside & North Wales	83.1	12	3.36	48.8	105(9)	25.5
Yorkshire	83.5	8	3.44	55.2	178(3)	24.1
South Western	89.4	15	3.84	53.6	80(11)	28.4
South Wales	90.5	13	3.78	56.9	73(12)	26.8
London	97.7	22	3.63	56.0	2748(1)	36.0
All Board Average	78.1	14	3.18	47.8		24.3

To evaluate the significance of this table it is necessary to consider:-

- distribution costs related to density of customers
- customer-related costs of meter-reading, money-collecting, and general administration.

An MMC study identified many ways in which costs of meter-reading, billing and collection could be significantly reduced by improving procedures.¹² Another possibility is that savings might be made by employing housewives part time to read meters (as is done in Japan) and by discouraging payment through board shops, which is far the most expensive way of paying bills (the SSEB's collection cost per £100 payment is 10p by direct debit, 14p by standing order, 37p by payment through giro and post offices and 59p through board shops⁴).

More radically, costs can be reduced by introducing 'smart meters' which communicate – and so can be read – via the telephone line or power line direct to the board. Such automated reading could be coupled with electronic transfer of funds. By these means the South Eastern Electricity Board estimates potential annual savings of the order of £150m. On the principle that there is no need to be other than best, then if all boards reduced their costs to those of the Eastern Board, there would be an annual saving of £120m in administration, consumer service and meter-reading.

The Plowden Committee considered that one major weakness of the Area Boards was their inability to challenge the CEEB on the Bulk Supply Tariff (BST) which comprises 80% of their costs. That situation is unchanged today. In January 1985 the London Electricity Board (LEB) refused a request by the London Electricity Consultative Council that it should scrutinise the BST. This relaxed, uncommercial attitude – so different from the relationship between a supermarket and its suppliers – is one fundamental weakness of the ESI, undermining incentives. To quote from an MMC study of the Yorkshire Electricity Board, because the major part of costs are bought in from the CEEB, then 'it follows that quite large increments to or savings in those costs which it can control can have only a minimal effect on its charges or on the rate of return which it achieves . . . in the circumstances it would not be surprising if YEB's approach to control costs was less rigorous than might be desired.'¹⁴

The industry has never done well in retailing. The Herbert Committee made the criticism that the boards undercosted their retailing activities in order to disguise their poor performance. In 1982 the Office of Fair Trading and in 1983 the MMC showed how the LEB had lost money on retailing for ten years. Similarly the SSEB lost money on retailing for nine years, troughing at a loss of 12.5% of turnover and 35% on capital in 1981/82. To take one example of retailing inefficiency, the LEB appeared to employ too many staff and pay them at ESI union rates, which are much higher than retailing wages.

The Electricity Council

The Electricity Council has a statutory duty under the 1957 Electricity Act to advise the Minister on questions affecting the

industry and to 'promote and assist the maintenance and development by the boards of an efficient, co-ordinated and economical system of supply'. In addition to these advisory and co-ordinating roles it performs a number of executive functions such as acting as the ESI's banker, preparing consolidated accounts and tax returns, undertaking research, running the industry's pension fund, negotiating salaries and wages, and looking after the national advertising programme. All this cost £61 m in 1985/86 (an increase in real terms of 45% since 1970/71). The Council's costs are recovered by a levy on the boards.

The Council's record in fulfilling these executive roles is not distinguished. For example, the industry pension fund has lost over £100m in abortive property ventures. And its record on pay negotiations do not suggest that it acts in the interest of its customers. Between 1975 and 1985 wages of employees in the ESI relative to those in manufacturing increased markedly. (Nor do the figures below take into account the additional benefit of ESI index-linked pensions.¹⁴)

	Average gross weekly earnings/hour of full time men (1985 £s)		Increase (%) over/decade
	1975	1985	
Manual ESI	3.85	4.71	22
Manual in manufacturing	3.52	3.87	10
Non manual ESI	5.11	6.69	30
Non manual in manufacturing	4.71	5.90	25

According to figures in the ESI, in 1981/82 in the ESI electricians were paid an average of £5.52 an hour, in private companies £3.97 to £4.62 an hour. A member of the Electrical Power Engineers' Association, opposing privatisation, recently wrote to the Union magazine '... no private industry management will continue to support the generous working arrangements that staff currently enjoy'.¹⁵ The industry's wage rates reflect its centralised bargaining structure and the employees' monopoly power to turn off the lights. Its industrial relations have been bought at a cost to the customer.

Nor does the Electricity Council adequately fulfil its duty of arbitrating statutory representations by individual customers and Consultative Councils against Area Boards. The Council's

procedures for hearing representations do not meet the requirements normally expected of tribunals. Members of the Council, of whom two thirds are Area Board chairmen, judge complaints against their own members. From nationalisation up to 1984 the Council upheld only two of the thirty-one representations by customers against an Area Board. Such achievement of near perfection does not ring very true.

The critical responsibility which the Herbert Committee conceived for a central authority was that of scrutinising the performance of the Boards. This it has not done. Otherwise it would surely have explained at least why crude comparisons of the performance of the ESI with that of other countries indicate that it is so inefficient compared with the industries of Japan, France, Germany and the USA e.g.:-

- the electricity supply industry in Japan employs 13% more people than the ESI here to serve almost three times as many customers with almost two and a half times as much power. Thus labour productivity is about twice as high.
- In aggregate, the investor-owned utilities in the US employ four times as many people as the ESI; and sell nine times the power to four times the number of customers. They are at least a quarter more productive. Electricité de France is over a fifth more productive.

Ten years ago the Plowden Committee accused the Council of being a consensus body that often had to function to the lowest common denominator. In 1979, despite the predominance of Area Board members on the Council and the concern which they are meant to have in the cost of wholesale power, the Council endorsed the CEGB's ill-conceived proposals to build fifteen nuclear power stations in a decade. The Council has never properly checked the CEGB's performance because as Mr R. Orson, an independent Council member, observed at the LEB 'the members of the Electricity Council who are chairmen of Area Boards do not press to scrutinise the CEGB because they in turn resist scrutiny of their own Boards'. Equally it has never checked Area Boards' performances. In the author's view the Council has failed because the Herbert Committee's recommendation that its members should be independent of the Boards was not followed.

The SSEB

Although the SSEB provides electricity 2% more cheaply than the ESI and enjoys a better record in constructing plant than the CEGB, it suffers from many of the same shortcomings. Like the CEGB it pays too much for coal and rail transport, and to an even greater extent than the CEGB it has suffered from political pressure to build power stations of an unwarranted size. Even before Torness (which has a capacity of 1250 MW) comes on line the SSEB has plant capacity of 7,400 MW to meet a maximum demand of only 4,500 MW. The average thermal efficiency of its fossil-fuel stations (33.8%) is slightly less than that of the CEGB (34.7%).

It also overmans its stations and suffers from restrictive practices. Its productivity is comparable to that of the ESI, with distribution rather more efficient than the ESI's (3.0 GWh sales per employee against 2.5 GWh), and its generation rather less efficient (4.4 GWh per employee against 4.7 GWh). The MMC criticised the Board for failing to reduce its manpower as vigorously as it should have done.

The SSEB's retailing performance has been deplorable. The cost of its meter reading, billing and collection is 50% more than the average costs of the Area Boards.

Pricing and financial controls

The real price of electricity declined to an all time low in 1973/4 of 3.7p/kWh (at 1985/86 prices) but subsequently increased to 4.8p/kWh. Tariffs in the following two years increased sharply after the increases in oil prices – and in coal prices due to higher wages paid to the miners (and ESI employees) after the 1974 strike. They then increased sharply over the period 1980/82. (This was due to a change to current cost accounting and the introduction of new financial controls.) They peaked at 5.1p/kWh in 1981/82 and subsequently declined to 4.5p/kWh in 1985/86.

The Government and the industry proclaim that electricity tariffs follow the principle of 'economic prices' and are based upon long-run marginal costs and the 'continuing costs of remaining in business'. Supposedly prices are similar to what they would be in a free market. This is no place for a detailed analysis of the technical issues involved nor for an explanation

published research-backed proposals into better ways of dealing with customers who were late in paying their bills. The ESI objected, alleging that the recommendations would cost £61 m in revenue expenditure and £145m in capital expenditure.²¹ These figures were shown to be inaccurate. But the recommendations were accepted only after a year's delay.

Area boards, being statutory corporations, cannot be contracted for statutory services such as connexion of supply. So they cannot be sued for late supply. Connexion to new developments can be and are delayed to suit the convenience of an area board rather than that of the customer. Furthermore, statutory corporations are not subject to the doctrine of estoppel so that when, for example, they make billing errors and subsequently correct them, customers have no redress. To quote a government report which is still lying idle 'not only do many customers feel powerless in their dealings with nationalised industries, they may actually have more limited rights of redress than in their dealings with private firms.'²²

Under the 1947 Electricity Act, Consultative Councils are charged with the duty of 'considering any matter affecting the distribution of electricity in the area'. In the debate leading to the nationalisation of the industry a government spokesman said that they would 'participate in the planning of the electricity supply for the whole area'.²³ They have not done so. They have been slow to use even the modest powers at their disposal. Even when they have tried to represent the interests of the customers (as when the London Electricity Consultative Council tried to stop the LEB setting an excessive and possibly illegal tariff) they were shown to lack the resources to seek a judicial review.²⁴

The public interest and public policies

It is in the national interest that electricity should be both produced and used efficiently. We have so far demonstrated that the ESI falls short of the first objective. Nor, according to the OECD's International Energy Agency, is the second objective being achieved. Britain consumes 0.73 tonnes of oil per \$1000 of gross domestic product, which is more than any other European nation. Germany consumes only 0.53 tonnes.²⁵ No less than 23% of Britain's primary energy consumption vanishes from the power stations straight into the atmosphere and rivers. Yet

the ESI consistently opposes the introduction of CHP schemes. Too many of the ESI's actions seem to be against the wider public interest of our country today and in favour of sectional interests. For example, both the Comptroller and Auditor General and the Audit Commissioner for Local Government have drawn attention to the significant waste of energy in publicly owned buildings such as hospitals and hard-to-heat council estates. And the Government spends £2.5 billion annually on heating support for low-income householders. Well and good – but manifestly the public interest is to ensure that energy is used *efficiently* in public buildings, and by people in receipt of public support.

At the root of the above criticisms lies a confusion about the nature of the 'public interest'. The presumption is that boards should act 'commercially'. But the word 'commercial' has many meanings. Some denote desirable characteristics such as that they should be efficient, should not be redistributive welfare organisations, should make decisions on economic rather than political grounds. But what happens when 'commercial' is equated with sales and profits in a manner inappropriate for a publicly owned monopoly? Monopoly profits are no indication of operational efficiency nor, within limits, of allocative efficiency. Management and unions in the industry proclaim that they should be left alone to run it, but in whose interest - in their own or in that of the customer and the general public? Should not the proper aim of a monopoly be to maximise 'net consumer benefit'?

Accountability

A campaign to avoid the public scrutiny of nationalised industries was instigated by Lord Citrine, Chairman of the British Electricity Authority, as soon as they were brought into being.²³ In 1950, concerned about their poor performance, Herbert Morrison advocated setting up an efficiency unit or a parliamentary committee, but the nationalised industry chairmen opposed the idea.²³ Twenty five years later NEDO observed that 'Boards of the nationalised industries sometimes seemed to aspire to a freedom from public scrutiny that is at odds with their status as publicly owned enterprises'.²⁶ Not until the 1980 Competition Act, thirty years after Morrison had first identified the need, was provision made for management audits.

The CEEB is secretive. It did not provide a copy of its Annual Development Plan to the Department of Energy until 1981; it was slow in providing information to the Energy Committee in 1981; it allows nobody (not even the Electricity Council) access to its system model. The Electricity Council conducts its proceedings in secret, declining to provide any formal account of them either to part time members of the area boards or to the Electricity Consumer Council. It has kept the results of consumer research studies confidential, and even classifies an annual report which compares the *published* tariffs of the area boards. Together with the CEEB it refuses to supply more information to the Electricity Consumers' Council about the basis of the BST.

Area boards are reticent with information, too. Minutes for the LEB board meeting of 26 June 1984 state that 'one member remained concerned about the way . . . the Consultative Council Chairman made it clear that he would give detailed reports to the Consultative Council. Debate in the Board would be less open and effective if it were being reported elsewhere . . . other members shared this concern, and wished to emphasise the strong view that individual members' views should never be quoted outside the Board'. What were they considering which the public, the owners and customers of the business, should not know? What were they bold enough to say in private that they declined to say in public? Very little, perhaps. But the minute is characteristic of the attitude of many members and officials. Why such secrecy? To disguise poor performance, and the way the industry is manipulated by the Government for fiscal and political purposes? The Energy Committee recently observed 'as a State owned monopoly there is no strong case for the ESI to have complete control over access to information on its operation and financing'.¹⁰ It is far easier for the public to find out about the operation of privately owned utilities in the US than about a system in Britain which the public nominally owns. Is not that an indictment?

Lack of checks and balances

Many shortcomings in the industry stem from a lack of countervailing checks and balances. In theory the first check is

supposed to be provided by the board members themselves whom Morrison envisaged as being the 'high custodians of the public interest'.¹⁸ In practice they seem rarely to act as an independent check on the executive. The Board of the LEB failed for many years to tackle the shortcomings of its shops and contracting; failed to deal with its perennial problem of high costs; failed to demand monthly operating accounts; failed to demand enough information to enable them to check that they were fulfilling their statutory duty to set non-discriminatory tariffs. The MMC has criticised the members of some area boards for their acceptance of management's relaxed attitudes, for failing to lay down objectives and monitor achievement and for 'not examining problems deeply'.¹² As NEDO observed 'it is often difficult to see the contribution which non-executive members can make to corporations in present circumstances. Their low remuneration

. . . reflects the comparatively limited contributions which they are in reality able to be allowed to make'.²⁶

The Electricity Council has been loth to scrutinise the performance of the industry. The Consultative Councils are ineffectual. And the Department of Energy, the industry's sponsor, is a perfect example of 'agency capture'. True, the MMC investigations under the 1980 Competition Act are welcome. But the Commission's audits are occasional, and are running well behind the schedule. Its terms of reference, prescribed by the Department of Trade & Industry, are often limited – perhaps for political reasons. The House of Commons Select Committee on Energy produces good reports, but has neither time nor resources for dealing with all the issues which merit consideration. Nor does it have power to compel attendance of witnesses and disclosure of papers.

Thus there is no effective forum for the regular examination of performance and of public policy issues relating to the ESI.

Foreign lessons

West Germany

The most striking feature of the German supply industry is the diversity of size and ownership of the various undertakings. About 300 companies are concerned with generating and transmission (of which the twelve largest generate 94% of all power sold by the public supply system); and 640 are concerned with distribution. Many companies, however, supply not only electricity but gas and also heat from CHP schemes (which in 1984 produced heat equivalent to about 10% of total electricity output, against less than 1% in Britain). About a fifth of the electricity companies are in private ownership; about three fifths are owned by public authorities; and the remaining fifth, which owns over 80% of the generation and supplies 63% of the sales, have a mixture of public and private capital.

By and large, regulation is the responsibility of the Ministries of Economic Affairs in the individual Lander; the Federal Government has a limited role in the industry. There is no 'official' central authority, nor any central union bargaining. Pay awards are negotiated on a company basis. Productivity is an eighth higher than in the ESI.

Sweden²⁸

The industry has great diversity and mix. The Swedish State Power Board, Vattenfall, produces just over half the supply, distributes about a fifth, and owns and operates the 220 kv and 400 kv grid. Another 10 undertakings – with large elements of private ownership – generate most of the rest of the power. Of the 322 distribution undertakings, 79 are privately owned, 79 are co-operatives and 164 are municipally owned. Reflecting the municipal involvement, half the oil-fired capacity is generated in CHP schemes, which in 1984 produced 1.3 TWh of electricity and 3.7 TWh of heat.

Generation and supply have many elements of competition, with markets in transmission capacity on the grid; in contracted deliveries of power between utilities; in short term

spot power; and in the assets of utilities. The large utilities are organised in a Power Exchange Group which co-ordinates the system to ensure adequate capacity, stability and provision of emergency power. The Exchange Group also operates the spot market both between its own members and internationally. It despatches generating facilities in merit order (i.e. in ascending order of operational cost in the way in which the CEBG despatches plant), splits the savings between companies' marginal costs and bills the resultant exchanges.

The Government has let the structure be, because although in theory it is somewhat inefficient the variety of ownership has distinct advantages. Different styles and attitudes compete, and 'peer pressure' operates in the many organisations carrying out similar functions. There appears to be more pressure to perform than in monopolies.

United States

The US industry comprises some 3,200 electricity undertakings, and sells ten times the output of the British boards. The 8% of the undertakings which are privately owned generate and supply nearly four fifths of the power. The industry evolved higgledy piggledy, roughly based on local franchises; but takeovers in some areas have created large integrated generating and supply companies, and utilities have more and more banded into 'power pools'. These are groups of generating utilities which operate – with by no means uniform success – a by and large integrated system that controls power station output, in a similar manner to the CEBG's 'merit order' operation. For example, all the major power stations in New York State are scheduled from one computer every five minutes.

Role and operation of State Commissions²⁹

When Franklin D. Roosevelt was governing New York State in 1930 he defined the Public Service Commission's role of 'people's counsel', stating 'it is not, and never has been, merely a court. It is rather intended to represent the public interest in connexion with various industries of a semi-public character subjected to its jurisdiction . . . the Public Service Commission is the representative of the legislature and, back of the legislature, of

the people . . . it has the sole function not of choosing between the people and the public utilities, but – as a representative of the people of this State – to see to it that the utilities do two things: first, give service, and secondly, charge a reasonable rate’.

The tenet underlying the American system is that in return for a monopoly franchise and the opportunity of earning a ‘fair’ rate of return for its shareholders, a company is bound to supply all customers who want service, and to charge reasonable and non-discriminatory tariffs as determined by a regulatory commission. The commission’s role is to guard against exploitation of customers and to ensure that the company operates in the public interest.

Public service commissions are essentially specialised tribunals for dealing with the complex issues involved in regulating public services. They are quasi-judicial bodies. They can subpoena people and papers; demand any information they want from the utilities they regulate; impose forms of accounts on them; and require them to have management audits. They can also make regulations under powers delegated to them by State legislatures analogous to those which our Parliament delegates to ministers. They operate within a framework of public service law, part provided by federal legislation, part by State legislation and part by case law. The 1978 Public Utilities Regulatory Policies Act (PURPA) governs features of the operation of both commissions and utilities. The Act requires *inter alia* open and reasoned decision-making by public service commissions; gives the public a right to make representations to them; requires non-discriminatory tariffs which reflect costs; and lays down codes of procedure for connexion and disconnexion. The commissions’ decisions can be challenged in State courts and on some issues in Federal courts, but contrary to a misconception in Britain, commissions do not spend a great deal of money on litigation.

The shortcomings of regulation are counterbalanced by many strengths. Good commissions provide a forum for examining and resolving hosts of complex issues in a decentralised and fairly depoliticised, objective, and rigorous framework. They make utilities publicly accountable for their performance, and redress the imbalance of power between the individual customer and large utilities. They provide an

independent forum for arbitrating complaints of customers, and for considering issues of public interest such as terms of trade between utilities and CHP system operators. They make for a more open and forthright style of public administration than we enjoy. Commissions may not be as effective as the disciplines of the market place, but the best ones are better at requiring efficient performance and customer responsiveness from electricity undertakings than are the centralised, slow and secretive British arrangements for controlling the industry.

Trends towards competitive generation

Several studies of liberalisation have been made by the US Department of Energy, and some of the leading regulatory commissions, academics and industrialists. The practical move towards competitive generation was initiated by PURPA which liberalised CHP systems, requiring utilities to buy power at a cost equal to that which it would have cost the utilities to generate. PURPA was ‘viewed by Congress as a means of reducing the monopoly power of the utility and providing the independent generator with an assured market for its output on reasonable terms and conditions’.³⁰ Independent generators have grown substantially in recent years. By the end of 1986 generating plant totalling 7,000 MW capacity was on line in Texas and California.

The Texas Commission requires CHP operators to bid competitively to supply power and ‘by mid 1984 it became apparent that the utility would be able to obtain real price competition among the cogenerators’. If a utility wants to build a new power station it must estimate at what cost it will generate power, and before receiving authorisation to build must offer the capacity to competitive tender. In New York and New England there is a surplus of generation capacity, and also Ontario Hydro is exporting power to the region. In California there is competition both from CHP operators within the State and from utilities on the Pacific North West coast and in Arizona and Utah. Recently the Virginia Electric and Power Company invited 22 tenders for 900 MW of capacity and accepted one offer of 500 MW and another of 400 MW from companies in West Virginia and Indiana.

Diversity

Long cash-flow drains from construction projects have weakened utility finances. Major disasters have led to major write-offs of bonds and disallowance of imprudent expenditure (which has been borne by the shareholders). For example the New York Public Service Commission has disallowed \$1.4 bn of the \$4.2 bn cost of the Shoreham nuclear power plant. Utilities are beginning to rely less on large centralised stations, and more upon a diversity and flexibility of supply in order to meet an uncertain future. For example the Electric Power Research Institute's report 'Electricity Outlook' observes that 'the future is uncertain and the consequences of pursuing an approach with long lead times that misses actual future outcomes are severe. Too much capacity raises customer costs in paying for unneeded capacity; insufficient capacity can lead to costs because of power outages . . . flexible technologies, those that can be added to the system quickly and in small increments, will allow utilities to respond to a wide range of events without excessive costs . . . the uncertainties utilities face require a portfolio of future generation options.'³¹ In consequence utilities are seizing the occasion to modernise old and small plants and develop CHP systems and combined cycle plants. They are beginning to exploit new technologies, too. Fluidised bed and coal gasification systems, built in smaller units, bid fair to reduce costs below those of conventional fossil-fuel sets. One market estimate forecast that up to the end of the century (apart from plant already under construction) 100 GW of generation capacity will be upgraded and 56 GW of new capacity will be built, of which only 3 GW will be new, large coal plants.

Restructuring the ESI

The evidence in this report leads to the conclusion that the customer is getting a poor deal from the ESI in England and Wales; electricity costs about a fifth more than it should. The ESI:-

- pays too much for fuel: commercial purchasing of coal could reduce tariffs by 8%;
- pays too much for generating plant: competitive purchasing could reduce electricity costs by 4% in the long term;
- pays too much for goods and services: it should be possible to reduce these costs by 20%; thus reducing total electricity costs by 2%; and
- pays too many employees too much: electricity costs could be reduced by 4% on this count alone.
- overprices by 5%.

Evidence from overseas demonstrates that there is nothing special about electricity which requires public ownership. Nowadays the historic arguments for integrated distribution and generating monopolies, necessary for the linking of demand in order to build up loads and gain the benefits of large generating sets and system economies, no longer apply. The national grid provides the linking, and it is no longer true that the most economical way to generate depends upon an exclusive reliance on very large generating sets.

Supply of bulk power has many of the characteristics of an ordinary commodity market. True, an electricity system has some unique features. Electrical energy cannot be stored as such long-term (but capacity can). The system must be balanced from second to second, or it will fail. But on the whole bulk electric power is little different from, say, bulk wheat or bulk oil. In place of statutory monopoly and State bureaucracy, economically and legally contestable markets would provide more diversity, more flexibility, more efficient use of resources and better value for money.

Proposals for reform

The three ways to privatise and restructure the ESI are (i) as a whole; (ii) as regional power boards modelled on the SSEB; and

(iii) as independent regional distribution companies based on the present area boards, splitting the CEGB into competing generation companies.

The first of these – outright privatisation as an integrated monopoly – would, to borrow words from the 1983 Conservative Party Manifesto, ‘merely replace a State monopoly by a private one and would waste a historic opportunity to ensure it did not exploit its position to the detriment of customers’.

Privatisation as regional power boards would be a little – but not much – better: it would merely replace a national monopoly with a set of regional ones, all with a similar lack of competitive incentives. Furthermore there is a considerable mismatch of generation capacity and consumption between different regions which renders this solution infeasible. For example, the maximum demands in 1985/86 of the London and South Western Boards were 3906 MW and 2324 MW respectively, while the capacities of plant within their areas were 976 MW and 431 MW respectively.

If we are to secure the industry from political interference and open it to pressures which will make it more efficient we must:-

- introduce private capital into the industry, distancing it from Whitehall;
- make generation competitive. This is the fundamental prerequisite to improving performance. Competitive generators would perforce buy their fuel in competitive markets. Competitive generators would seek to construct and operate plant as economically and efficiently as possible. Diverse ownership would encourage diverse technologies and commercial views to flourish; and
- create distribution companies as a countervailing power to the generators (as supermarkets are to food suppliers), with a clear interest in buying cheaply.

Generation

The CEGB should be broken up into nine or ten separate generating companies, all of similar capacities of about 4-5000MW and assets of the order of £1.5 billion. As far as possible each company would have a similar portfolio of generating plant, balanced between large modern coal stations, older small coal

stations, oil stations and gas turbines, which they would either own outright or in part (as is common in the US). Thus they would all start from the same competitive point and face identical hazards of fuel price changes etc. Most importantly, in order to maximise competition, the generating capacity should not be geographically concentrated, but be dispersed throughout the country. These well-scattered generating companies would contract directly with the distribution companies (see below), and with anyone who wished to make a forward market in electric power. They would also sell on the spot market through TRANCON (see below). No one company would be allowed to supply more than a fifth of the total requirements of the area boards.

Nuclear generation presents a problem. The eight old Magnox reactors will soon have to be decommissioned at a substantial (if uncertain) cost. They are clearly unsaleable and will have to remain in public ownership. Post-Chernobyl, the five AGRs scarcely seem an attractive investment; and it might well be difficult – if not impossible – to write a prospectus for their flotation unless the Government were to insure them against disaster. They could, however, be offered for sale to a consortium of the private companies who built them, who should have the skills to run what they have built, and who lobby so energetically in favour of nuclear power. Alternatively they might be offered as a management buyout (perhaps funded in part by the ESI's pension fund). Failing these courses they would have to be retained together with the Magnox reactors in a Board which might be combined with British Nuclear Fuel. This Board would not be empowered to build new plant – any such plant should be built with new money – and any investment it undertook would aim to achieve a pre-tax target discount rate of 9% real.

The generating companies can be publicly floated or sold by private treaty. Given that the CEGB's accounts are satisfactory in historic cost terms, then its division into parts should present no difficulties. In order to provide some initial stability of earnings and costs while introducing competition, each company should have a like portfolio of contracts made with distribution companies which would meet, say, 90% of the latter's forecast demand for the first year of operation (leaving 10% to be met by

the spot market). These contracts would taper by perhaps 7.5% annually – i.e. the initial ones would fall to 60% after four years and so on. The generating companies would have similar tapering arrangements to take fuel from British Coal on a mix of contracts: some fixed price, some related to world price.

Once the companies were operating they, or anyone else who wishes to enter the market, would be free to develop new generation facilities (without any special licensing except in the case of nuclear installations). A developer who wanted to promote a scheme might offer options for sale, or he might put together contingent contracts for some or all of the output in the same way that property developers put together pre-lets. To preclude disruption should a company go into liquidation, the liquidator of a generating company or of an electricity distribution company would, like the liquidator of a private water company have a duty to continue its operation to the extent required by TRANCON.

Electricity distribution companies

The area boards should be privatised in their present form, as electricity distribution companies. They should retain their obligation to serve customers who take less than (say) a quarter of a million kWh annually, and who thus comprise the 'tariff market'. Customers taking more than this could bargain for contracts in a structure similar to that obtaining in the gas market; and could bypass the distribution companies by using the distribution network direct as a common carrier – as indeed could independent generators themselves. On the other hand distribution companies would be under no obligation to serve such customers.

The companies would be subject to the same requirement of non-discrimination as at present. They would be free to buy electricity from anyone who chose to sell. But in general they would not be allowed to own generating capacity or another electricity distribution company – although they would be allowed to own or have a part in district heating and industrial CHP schemes. In addition, statutory provisions should impose clear duties on them to promote CHP schemes, to use energy efficiently, and to purchase competitively. 'Sweetheart' deals with favoured generators would be a criminal offence.

The electricity distribution companies would be regulated by the Electricity Commission (see below) on the basis of a licence incorporating the price formula $RPI \text{ minus } X \text{ plus } Y \text{ plus } Z$, set for five years. X would be a factor based on an estimate of the companies' scope for reducing controllable costs; Y would be the local authority rate levy; Z would be an index of the average cost of the companies' purchased power weighted for the load factor. The consequent prices would be adjusted annually. At the end of five years the formula itself would be revised and X would be reset, taking into account *inter alia* the average performance of the distribution companies in reducing their costs over the period. But the new prices would not simply reflect the new cost level for each company. Companies would be entitled to keep a portion of the sums they had saved – over and above beating the bogey of ' X ' (see appendix A). Such a system would ensure that although electricity distribution companies would not have to compete for their load, they would have to compete for favour in the capital markets. Above all they would have a clear incentive both to reduce their controllable costs and to purchase electricity efficiently.

The transmission and control company

A transmission and control company – TRANCON – should be set up, owned on a mutual basis by the distribution companies. TRANCON would:-

- own the national grid (which by law would be a common carrier), the Dinorwig and Ffestiniog pumped hydro systems and despatch control;
- have a statutory duty not to discriminate against any generator or distribution company;
- set rules (subject to the agreement of the Commission) requiring distribution companies to meet standards, in particular ensuring that their supply capacity was adequate. TRANCON would also set rules for generators who wished to obtain maximum payment by providing power, especially when it was most needed. Namely, such generators would have to agree to TRANCON despatching units, taking such measures as were necessary to ensure the stability of the system, and scheduling maintenance;

- despatch generating sets in merit order based upon price offers of marginal operating costs, and without paying regard to contracts between generating and distribution companies. Resultant savings would be split between the generators and distribution companies;
- implement the spot market and bill the generating and distribution companies for the interchanges;
- have a duty to develop the transmission system. To that end TRANCON would be empowered to raise funds on the strength of its ability to recover its costs from the distribution companies.

TRANCON would be run like a transparent non-profit trust, in the public interest.

The Electricity Commission

The present Electricity Council would become an Electricity Commission, modelled on the best US practice. That is, five commissioners would be appointed for staggered terms of five years each. Their duties would be laid down in statute. It would operate openly and by due process, and its decisions would be subject to judicial review. Its role vis-a-vis the electricity distribution companies would be to:-

- ensure that they fulfil the terms of their licences, and their statutory duties;
- set the terms of price control every five years (see above) to ensure that customers paid a 'reasonable price' and obtained a share of any productivity improvement; that investors had the opportunity of earning a 'fair' return comparable with investment in stocks of similar risks; and that management had an incentive to improve performance;
- arbitrate complaints by customers (to this end the Commission would run a regional network of small offices);
- arbitrate terms of trade between the distribution companies and independent generating companies;
- ensure fair trading by distribution retail shops and contracting;
- regulate the accounting;
- scrutinise (but not regulate or be responsible for) forecasts and capacity plans made by distribution companies.

In addition it would ensure that TRANCON fulfilled its duties. The Commission would also be given limited powers over

the generating companies, to ensure that they did not collude with each other or with distribution companies (collusion would be a criminal offence for which the Commission would have a duty to prosecute). It would promote competition and diversity in the development of generation, and be empowered to rule on general issues of public interest. They hardly do that.

One major responsibility of the Commission (similar to that of the Stock Exchange) would be to provide a framework within which generation companies, distribution companies, energy dealers and energy brokers could operate both a secondary forward market in power and (if feasible) a futures market, in an open and regulated manner with posted prices. Distribution companies would enter into long term contracts to purchase power to the extent that they considered it in their economic interest. If they expected a decline in costs, say through a technological advance, they would wish to provide for some of their needs in the short term market; conversely, if they expected costs to rise they would seek to buy long. The ability to buy and sell contracts for different periods and terms would enable them to manage a portfolio of capacity and energy, so as to satisfy their estimates about future changes in their own demand and in relative fuel prices. Similarly a generating company might wish to withhold from long term sale a portion of a new unit, and want to hedge by selling short-term capacity forward. If demand for long-term contracts exceeded the capacity on offer, the prices of options and of contracts would be bid up; and the high profits realised would lead to new proposals for additional capacity. The Commission's responsibility for operating the power market is central to this proposed restructuring.

The SSEB

The SSEB should be privatised as a power board regulated by the Electricity Commission. Enough performance data would be available from the system in England and Wales to ensure that it did not exploit its monopoly. A duty would be placed on it to buy power competitively (i.e. not just from its own plant, if supplies from England were available at lower cost). Further study is needed on how best to treat the North of Scotland Hydro Board.

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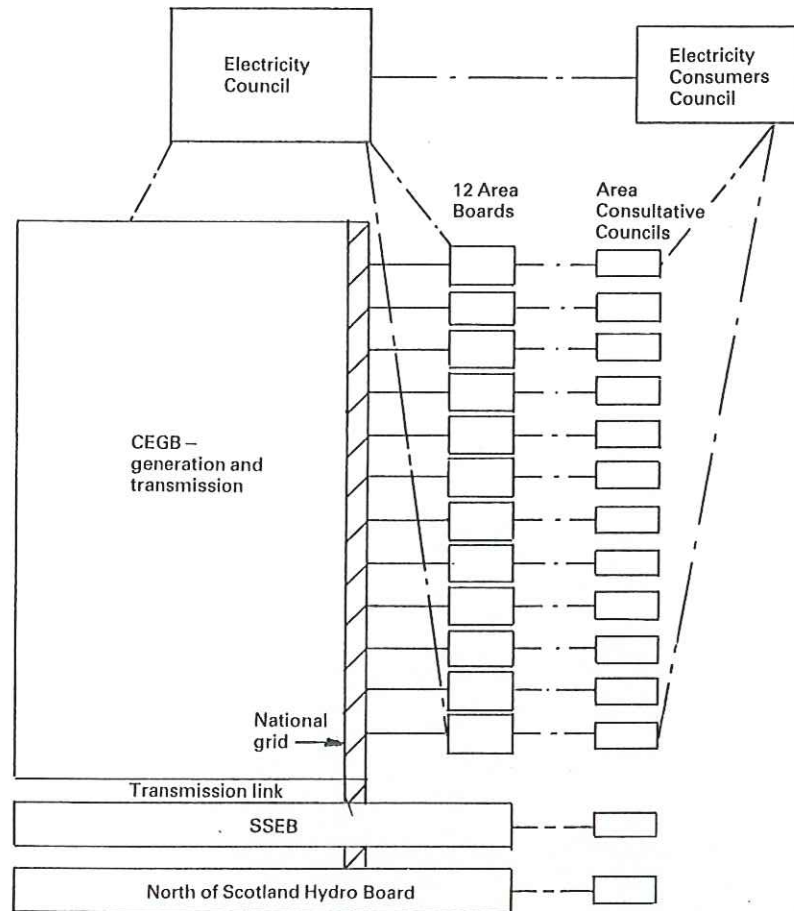
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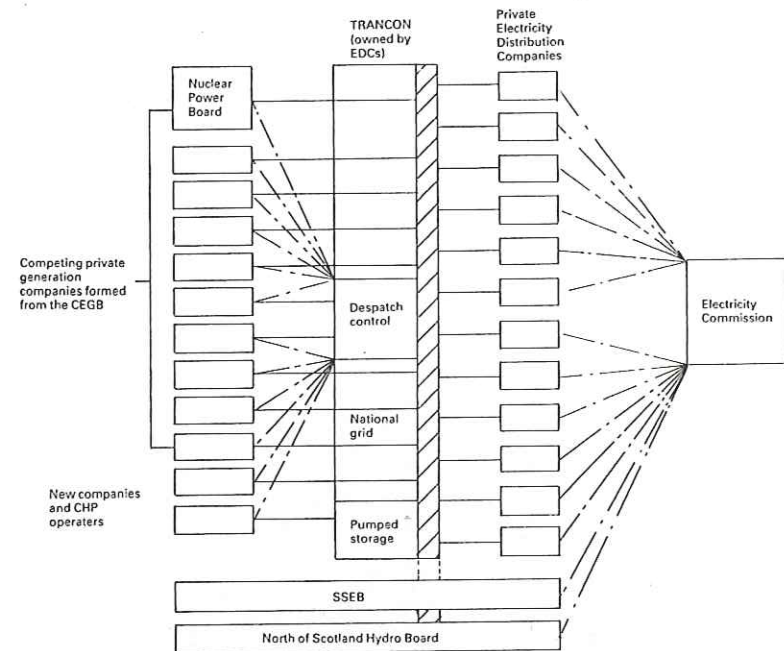
Glossary

AGR	Advanced gas cooled reactor.
BNFL	British Nuclear Fuels Limited.
BR	British Rail.
BST	The CEGB's Bulk Supply Tariff.
CEGB	The Central Electricity Generating Board.
CHP	Combined Heat and Power system that produces both electricity and heat for either district heating or industrial process heating.
EFL	External Financing Limit, the Treasury cash limit within which nationalised industries have to operate.
ESI	The Electricity Supply Industry of England and Wales comprising the Electricity Council, the CEGB and 12 Area Electricity Boards.
GW(h)	Gigawatt (hour) = 1000MW (hour) = 1,000,000kW (h).
kW(h)	Kilowatt (hour).
LEB	London Electricity Board.
MMC	Monopolies and Mergers Commission.
MW(h)	Megawatt (hour) = 1000kW (hour).
NEDO	The National Economic Development Office.
PURPA	Public Utilities Regulatory Policies Act, passed by the US Congress in 1978.
PWR	Pressurised Water Reactor.
SSEB	South of Scotland Electricity Board.
TRANCON	Transmission and Control Company, a part of the proposals for reorganising the ESI, comprising the national grid, the despatch control and the two large pumped storage stations.
TW(h)	Terrawatt (hour) = 1000GW (hour).
UKAEA	United Kingdom Atomic Energy Authority.
VEPCo	Virginia Electric and Power Company.
YEB	Yorkshire Electricity Board.

Present structure of electricity supply in Britain

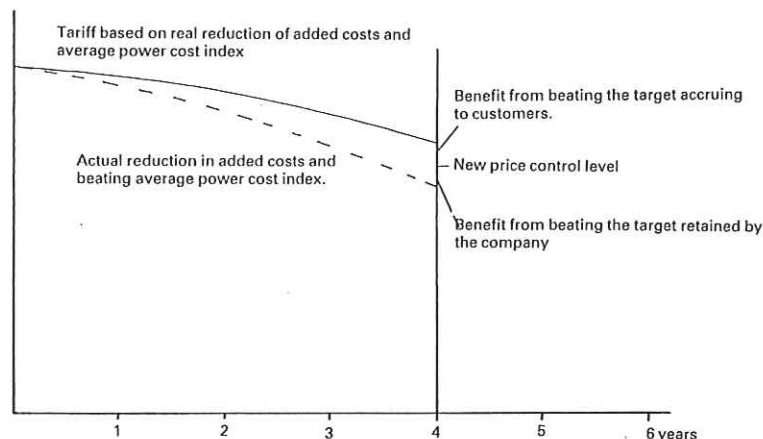


Proposed structure of electricity supply in Britain



Appendix A

Incentive price control mechanism with shared benefits



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