

Surrey Energy Economics Centre

DEMAND FORECASTING METHODS AND THE 'NEED'
FOR NEW NUCLEAR PLANT

by Colin Robinson

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- Page 9:**
1. Delete 1st line: "of growth of sale. In all ... anticipated"
 2. Add final line at 6.1: "other private generators in England and Wales with Generators in Scotland and on the"
- Page 11:** Amend "IN" to "IS" at "7. WHY THE CEGB'S CASE IS UNSATISFACTORY"

**DEMAND FORECASTING METHODS AND THE 'NEED'
FOR NEW NUCLEAR PLANT**

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This paper was submitted to the Public Inquiry into the proposed nuclear power station, Hinkley Point 'C', on behalf of the Consortium of Opposing Local Authorities. It originally appeared as document COLA 25 in March 1989. The paper is published here as originally submitted except that an introductory paragraph is omitted and some very minor amendments are made to Section 1.

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1. INTRODUCTION

1.1 In an earlier Proof of Evidence for the Hinkley Inquiry (COLA 4), I discussed the demand forecasts and the conclusions drawn from them in the CEGB's Statement of Case to the Inquiry. The purpose of this additional Proof (COLA 25) is to amplify those comments in the light of a meeting with the CEGB on 17 November 1988 about its forecasting methods and further information given by the CEGB both at that meeting and subsequently. Where I refer to the notes of that meeting I describe them as 'Meeting Notes'.

1.2 In COLA 4 I criticised the CEGB's demand forecasts on three grounds:

- i) they fail to analyse uncertainty
- ii) the description of methods used is insufficient for an outside observer to assess the quality of the forecasts.
- iii) The CEGB's forecasts appear to be those the Board would have made had the industry continued under nationalised ownership. They take no account of the structural changes in electricity supply which will follow from privatisation (in particular, the end of generator dominance and the greater power of distributors) which will fundamentally change incentives in the industry.

1.3 As a result of the meeting mentioned in 1.1 above and the further information supplied by the CEGB, the Board has clarified to a certain extent the forecasting methods it uses; that is, it has supplied some of the information necessary to deal with criticism (ii) in para. 1.2 above. However, it has not dealt with criticisms (i) and (iii). Nor, so far as (ii) is concerned, has it provided any convincing evidence that its forecasts are satisfactory for the purposes of this Inquiry.

1.4 I begin by setting out my understanding of the approach the Board uses. Although some of the methods used have been described (especially in the Proof of Mr Jenkin - CEGB 4) I do not believe the essence of the CEGB's approach to forecasting has previously been made clear to the Inquiry. In the course of my description, I will explain some of the deficiencies I see in the Board's approach. Then I explain the reservations I have about the Board's case for the proposed Hinkley Point 'C' on 'capacity requirement' grounds.

1.5 The CEGB's approach to forecasting is considered under the following three headings: total sales of electricity, maximum demand and allowing for uncertainty. I refer, where necessary, to the Meeting Notes and to a document provided by the CEGB at the 17 November Meeting entitled, Medium and Long Term Load Estimates: Methodology and Forecasts: 1987-88 Planning Cycle, written by the Economic Studies Section, Strategic Studies Department and dated April 1988. For short, I refer to this document as 'Load Estimates'.

2. TOTAL SALES OF ELECTRICITY

2.1 In forecasting total sales of electricity, the CEGB divides the energy market into a number of sectors which can readily be identified from British energy statistics - principally domestic, industrial, commercial, farms, transport and public lighting. Further divisions are then made both into sub-sectors (for example: iron and steel and other individual industry groups within the industrial sector) and into end-uses of energy (for instance, space heating, water heating, cooking and appliances within the domestic sector and process heat, motive power and heating within the industrial sector). Similar kinds of sub-divisions can be found in the forecasting systems used by other energy industries in Britain, because the Department of Energy's statistics lend themselves to this kind of sector analysis. The CEGB also uses specially commissioned market research data in order to make its analysis more specific to electricity.

2.2 I would summarise the CEGB's approach to forecasting as consisting of the following six steps:

i) the disaggregation of energy consumption within each sector as seems appropriate, formulating both time series (statistics of a period of time) and cross sections (statistics at a point in time). These statistics can be used to analyse past relationships and subsequently to make forecasts. According to the Board's forecasters, they rely mainly on cross sections and use a 'bottom-up' approach which builds up total electricity sales from the disaggregated statistics (para. 6 of the Meeting Notes);

ii) for each sub-sector the selection of one or more 'activity indicators': by 'activity indicator' I mean a variable which is assumed to express the general level of economic activity in the sub-sector and which therefore influences its energy consumption. It can, for example, be the output of a particular industry (which affects energy consumption for motive power and process heat), or the amount of floorspace in offices (which affects heating demand), or the real income of consumers (which affects their ownership and use of energy-consuming appliances);

iii) the assessment of the historical relationship between each activity indicator and energy consumption in the relevant sector. Each activity indicator is then forecast and, from those forecasts, sub-sector and sector energy consumption forecasts are derived. An attempt is made to allow for efficiency improvement in relating expected changes in energy consumption to expected changes in the activity indicators;

iv) the selection of some variables (competitive factors) which are believed to indicate the competitive position of electricity relative to other fuels (for instance, relative fuel prices or relative technical characteristics) and the assessment of their effects;

v) the estimation of electricity's future share of the energy market in each sector from forecasts of the competitive factors in each sector; and

vi) the application of the market share forecast in a sector to the total energy forecast in that sector (made as described in step (iii) above) to estimate total sector electricity sales.

2.3 A feature of the CEGB's approach is that, despite the degree of disaggregation which characterises this kind of 'bottom-up' methodology, the relationships between key variables are not at all explicit. It appears that no systematic modelling, of the kind with which economists are familiar, is employed except to the extent that the formal macro-models of outside organisations (such as the London Business School) are used to formulate a view about the possible future growth and structure of the economy. We were informed by the CEGB that most forecasting errors in the past had occurred because of erroneous views taken of future economic growth and structural change (para. 8 of the Meeting Notes): if I understand the Board's methods correctly, it was unlikely to find otherwise since economic growth and structural change appear to be the dominant influences on the forecasts of total electricity sales.

2.4 The effects of changes in other variables (especially the competitive factors) are apparently assumed to be minor in most sectors. To the extent that estimates are made of these effects they are evidently not very explicit, being assessed primarily by the 'judgement' of the Board's forecasters. For example, little influence appears to be attributed to changes in relative fuel prices except in the domestic sector and, even in that sector, the effects of price changes appear to be subsumed within the judgement of the forecasters rather than made explicitly (para. 21 of the Meeting Notes). Consequently, as I pointed out in COLA 4 (para. 3.6), it is not possible to determine whether the Board has made any allowance in its forecasts for the probable depressing effect on electricity consumption of the price increases which it has already made and those which it has still to make to reach its new financial target. There was an average increase of 9 per cent last April, there is to be another increase of 6 per cent in April 1989 and further increases are likely in the near future to cover the costs of controlling emissions to the environment.

2.5 Nor is any attempt made, so far as I am aware, explicitly to evaluate the effects of marketing campaigns on sales of electricity. Given the expensive campaigns which both the gas and electricity supply industries have mounted in recent years, it seems surprising that no account appears to be taken of those campaigns when investigating the determinants of electricity sales in the recent past. If prices, marketing campaigns and other competitive factors are omitted when evaluating past determinants of electricity sales, the estimates of those determinants which the Board does try to take into account will be misleading.

2.6 From the meeting on 17 November, I gather that virtually no econometric analysis or explicit modelling is done. Certainly we have seen no equations or other evidence of systematic evaluation for individual energy sub-sectors which specify the variables which are assumed to determine energy and electricity demand and make explicit the

relationships between those variables and the individual sub-sector demands (para. 6 of the Meeting Notes). It is clear that, within each sub-sector for which a forecast is made, a very large element of 'judgment' enters into the relationships which are used.

2.7 Judgment is an essential feature of all good forecasting systems. Forecasts cannot usefully be made by mechanical extrapolation of the past nor by the unquestioning use of past relationships. Judgment does, however, need to be kept within bounds. It is best employed within a clearly specified framework which forces the forecaster to be explicit about his or her assumptions and methods. In other words, some kind of 'model' is needed. That is what is most lacking in the CEGB's forecasting system as it has been described to us. One of the advantages of clearly-specified models, whether or not they are sophisticated in statistical terms, is that the outside observer can see exactly which variables enter into the forecasting process, how good a fit the model has been to past experience and what relationships have been estimated.

2.8 For example, in the domestic sector one would expect real income, the number of households, fuel prices and the prices of fuel-using appliances to be important determinants of the demand for energy-using appliances and the demand for energy. Within the domestic sector's total demand for energy, key determinants of the demand for electricity would, for instance, be relative prices of appliances and of fuels, relative advertising and other marketing expenditures on various fuels. Most of these factors (though apparently not advertising and other marketing expenditures) appear to figure in the Board's forecasts. The CEGB has provided information on its assumptions about future real consumers' expenditure (which is a proxy for real income), the number of customers, central heating ownership and the relative price of electricity versus gas (Table 2 of Load Estimates and in a letter dated 20 December 1988 from Mr Tivey to Mr Thomas). However, it apparently has no estimates of the relationships between each of these variables and the demand for energy or the demand for electricity because it does not make its forecasts in such explicit fashion: instead its forecasters employ their judgment. Consequently, there is no information on the crucial 'elasticities' of electricity demand with respect to its principal determinants, as I contended there should be in para. 3.5 of COLA 4.

2.9 In explaining its approach to forecasting at the 17 November meeting and subsequently, the CEGB provided two sets of information: one is a list of the factors it has taken into consideration in making its forecasts (the assumed determinants of demand) and the other is the values of some of those determinants which it has assumed for future years. There is, however, a missing link - what are the relationships between the determinants of demand and demand itself? In practice, given its forecasting methods, the CEGB cannot supply the missing link because the relationships in question are not

systematically explored but are implicit in the 'judgment' of its forecasters. In my view, the CEGB's approach to forecasting total electricity sales relies excessively on the judgment of its forecasters to the exclusion of a more systematic approach. I discuss further, in sections 5, 6 and 7 below, the problems of relying on the judgment forecasts of an organisation which, assuming privatisation proceeds, will not be responsible for providing capacity in the future.

3. MAXIMUM DEMAND

3.1 Given the variability of electricity demand over the day, to establish the capacity requirement corresponding to a given total sales forecast, a load curve forecast has to be made which estimates future electricity consumption by time of day. The CEGB evidently uses a disaggregated approach in this case also. Load curves for sub-sectors within each demand sector are forecast - presumably by means of the judgment of the CEGB's forecasters, since no more formal methods were indicated to us by the Board.

3.2 Individual load curves, forecast as explained above, are then aggregated to provide an estimated load curve on a cold winter's day; this curve is subsequently adjusted to Average Cold Spell (ACS) conditions. The highest demand shown becomes the forecast of unrestricted system maximum demand (SMD). Another judgment is then made to assess the extent of load management relief which can be subtracted to indicate restricted SMD.

3.3 As in the case of the total sales forecasts (Section 2 above), there is clearly a very large element of judgment in the forecasts of restricted SMD which form the basis for the estimates of future required capacity. Indeed, the CEGB appears to use no formal methods whatsoever to assess, for example, the effects of pricing policy on the load curve. We specifically asked the CEGB whether any account was taken of possible changes in price policy in future which might affect the shape of the daily load curve; we were told that no such changes has been assumed (para. 29 of the Meeting Notes). As explained below, failure to analyse the effects of price policy on the load curve seems to be a rather serious deficiency when the industry is on the verge of structural changes which are likely to lead to price policies which differ significantly from those of the past.

4. ALLOWING FOR UNCERTAINTY

4.1 In COLA 4 I explained that the CEGB's Statement of Case presented only 'point' forecasts, giving no explicit attention to the uncertainty of the future. I argued, therefore, that there was no basis for determining how robust might be the case for Hinkley Point 'C' on 'capacity requirement' grounds.

4.2 This very serious gap in the CEGB's case remains. Although more information has been provided on the results of the Board's forecasts for individual sub-sectors and end-uses, it is all in the form of point forecasts. No information has been given about how the forecasts might vary according to what happens to key determinants (as I suggested it should be in paras. 2.3 and 2.4 of COLA 4). I recognise the difficulty the Board faces in trying to provide such an analysis of uncertainty. As explained in sections 2 and 3 above, its forecasting methods are not very explicit and lean very heavily on its forecasters' judgment; consequently, a systematic analysis of uncertainty, attributing variations in demand estimates to variations in key determinants of demand, is probably more than its forecasts can bear. Nevertheless, I note that in other contexts the Board is willing to provide scenarios intended to demonstrate the uncertainty attached to the future. For example, in Mr Jenkin's Addendum 5 to his Proof (CEGB 4 ADD 5), which makes comparisons between nuclear and fossil fuel plant, there is an Appendix which explores some fossil fuel price scenarios, and the main part of the Addendum contains a number of sensitivity analyses.

5. HOW APPROPRIATE ARE FORECASTS MADE NOW BY THE CEGB?

5.1 An issue I raised in COLA 4 (paras. 4.1 to 4.8) was whether it is appropriate to use, in assessing the 'need' for a new power station, forecasts made by the CEGB in its existing role when the electricity supply industry is on the eve of what the White Paper on Electricity Privatisation (Inquiry Document S69, para. 35) describes as " ... a fundamental change from the existing organisation". I pointed out the inherent upward bias in forecasts of both demand and capacity which is likely, given the environment within which the CEGB operates, and argued that the incentive structure of the industry will change significantly after privatisation.

5.2 There are some curious features of the timing of the application to build the proposed Hinkley Point 'C'. It is not just that the organisation putting forward the application would not have responsibility for building and operating the station if approval were to be given, though that is an unusual enough circumstance. An additional and significant feature is that the present government has quite clearly stated that it wants an entirely new regime in electricity supply; in particular, it wishes to end a situation which "... gives the CEGB too much influence in power station investment decisions ... and too little say to the Area Boards whose customers have to meet the costs". (Inquiry Document S69, para. 16). Acceptance of the CEGB's forecasts is one way in which this Inquiry could, in the face of government policy, permit the CEGB's excessive influence in power station investment decisions to be prolonged into the post-privatisation period.

5.3 A related point I would now make, having seen the CEGB's forecasts in more detail, is that the heavy reliance placed on 'judgment' (as distinct from more formal methods) must raise questions about the appropriateness of forecasts it makes for the post-privatisation period. Reliance on judgment might not be too unreasonable if the CEGB were to be the responsible private company in the future and so was backing the judgment of its managers with the resources of its shareholders. But, unless privatisation fails, the CEGB is about to disappear and its judgments about future demand are of questionable relevance.

5.4 I would indeed argue that demand and capacity forecasts made under the old regime are likely to be seriously misleading as guides to what may be expected after privatisation. Changed incentives in the privatised industry are likely to result in different growth rates of demand and different capacity provisions from those now foreseen by the CEGB.

5.5 I explained in COLA 4 that, up to now, the CEGB has operated in a 'cost-plus' environment in which it has, in effect, projected forward demand and then built plant to satisfy that projected demand, passing the costs on to consumers via the Area Boards. A forecast that total electricity sales would increase has been assumed to mean that maximum demand would increase by approximately the same amount so that capacity (including the margin) should be increased by that amount also. Successive governments have failed to provide incentives and to set ground rules which would economise on the provision of capacity and generally act to minimise costs. In the words of the White Paper (Inquiry Document S69, para 39), "... there is no real external pressure on the CEGB to ensure total capacity is minimised, that its most efficient plant is available or that its costs are kept as low as possible."

5.6 It seems to me very significant that the CEGB claims that privatisation should not affect future electricity sales and maximum demand: it will merely affect the proportions of demand met by different generating companies (para. 1.20 of the Statement of Case, CEGB 2). The premise that privatisation will not affect demand has therefore become embodied in all the judgments which have been made by the CEGB's forecasters in a forecasting system which relies very heavily on judgment. Consequently the premise colours the conclusions they reach.

5.7 Because the impact of privatisation has in effect been assumed away, the CEGB has made its forecasts on the implicit assumption that the industry goes on much as before with the CEGB still in control, supplying the capacity which it thinks necessary to meet its projections of demand. That would explain the minor role ascribed to prices and other marketing instruments in influencing demand (see section 2 above) which might have been a reasonable assumption to make if the CEGB had continued as monopoly

generator but is not reasonable at all given the imminence of privatisation. Moreover, the Board's forecasts (Table 19 of Load Estimates) also indicate that own generation and 'outside' purchases by Area Boards will continue to be very small (about 1.5 per cent of forecast sales in England and Wales in 2000-01); that is clearly inconsistent with the government's declared objective of stimulating competition for the CEGB's two successors and allowing distributors to generate for themselves up to 15 per cent of their requirements.

5.8 Not surprisingly, since a major structural change in the industry has been assumed away and since the forecasts are made by similar methods to those employed in other recent years, the outcome of the Board's forecasts is rather close to an extrapolation of recent experience. In individual sectors of demand, rates of growth of electricity sales do differ from those of recent years but in total there is a remarkable similarity. The forecasts the Board originally presented to the Inquiry (Table 1.2 of its Statement of Case, CEGB 2) showed a rate of growth of total sales from 1986-87 to 2000-01 of 1.5 per cent per annum. That is identical to the rate of growth of UK electricity sales from 1970 to 1987. Subsequently, the Board revised upwards its sales forecasts so that the 1986-87 to 2000-01 growth rate is now 2.1 per cent per annum (CEGB 4 ADD 1, Revised Table 4) which is about the same as the rate of increase since 1981 when the British economy began to recover from recession.

5.9 In my view, the demand forecasts presented by the Board are not an indication of what is actually likely to happen up to the year 2000; they indicate what the CEGB would expect to occur if the industry were not privatised. In such circumstances, the Board would evidently expect electricity sales growth to proceed much as it has in recent years and it would expect restricted SMD to increase only slightly more slowly than sales (at 1.9 per cent per annum according to CEGB 4 ADD 1, Revised Table 4). Thus it would presumably expect to build capacity more or less in step with demand. Hence the 'need' for an extra 15.5 GW. But such forecasts can hardly be what the Inquiry needs to know. Privatisation is imminent, unless some remarkable about-turn in government policy occurs. Its impact clearly must be taken into account, as far as one can, in contemplating such a major decision as whether or not to give approval to a new nuclear power station.

5.10 I should make it clear that my comments on the CEGB's forecasts are in no way intended as a criticism of the Board's managers and forecasters. I simply regard the forecasts as a predictable outcome of the industry's structure. Given the industry's present incentives, it is entirely understandable that the Board should make point forecasts of sales which assume a continuation of recent experience and that it should neglect consideration of alternatives to building capacity pari passu with the expected rate of growth of sales. In all organisations, resources flow into uses where anticipated

of growth of sales. In all organisations, resources flow into uses where anticipated rewards are greatest. The CEGB has had considerable monopoly power for many years and there has been extensive political interference with its decisions. Because of its monopoly and its consequent ability to pass on costs, it has not seemed worthwhile to devote substantial resources to the investigation of ways in which price or other marketing policies could be used to manage the rate of growth of sales or to reduce the amount of capacity required for any given level of sales. Political incentives also dictated that the industry would be supply-driven: increasing capacity was a means of increasing the size and influence of the Board. In recent years there has been some attempt at 'load management' for large consumers but this has been marginal (the equivalent of about 2.5 GW of capacity) and there has been some attempt to charge larger consumers according to their use of capacity. But there has been no incentive to put in place a price structure which would give to a wide range of consumers the correct signals in the sense of varying price significantly by time of day and season of year.

5.11 To summarise, in my view the capacity requirement which the CEGB now foresees is a direct outcome of the present structure of the industry, of which the government is so critical, rather than its future structure. It may be that, if the CEGB had remained as dominant generator within a nationalised electricity supply industry of the kind which now exists, it would have planned to begin construction of 15-16 GW of new plant by the end of the century. However, even if that is so, it is not in my view relevant to this Inquiry which, it seems to me, needs to judge what the 'capacity need' will be under the new structure not the one which is about to be superseded.

6 THE IMPACT OF PRIVATISATION

6.1 The government's intention is to change the balance of power within the electricity supply industry so that it is less supply-driven and more orientated towards the needs of consumers - the aim is that "... the customer, not the producer or distributor, comes first" (para. 66 of the Electricity Privatisation White Paper, Inquiry Document S69). After privatisation the objective is that there should be competition among generators to serve both distributors and some consumers direct; distributors will be subject both to actual competition from other distributors and generators and to 'yardstick' competition from other distributors. The industry will be supervised by a regulator (the Office of Electricity Regulation - OFFER). The change to a more decentralised structure is likely to affect both demand growth and capacity provision. Moreover, open regulation will also have an effect. Nationalisation is itself a form of regulation but it works principally by 'backdoor' means which cannot be observed by the public. The presence of a regulator operating more explicit rules will almost certainly alter incentives in the industry. Privatisation will, of course, also affect sources of generation; since the new distributors will be able to contract not only with the CEGB's two successors but with

Continent, a forecast that a given amount of capacity is required in the future does not necessarily imply that National Power or PowerGen should build that capacity. I return to the subject of generation sources in section 7 below.

6.2 To be more specific about the effect of privatisation, I would expect it to affect future demand and capacity provision principally as follows:

(i) distributors, which are the contact point with the industry for the great majority of consumers, will replace the CEGB as the prime driving force in the planning of new capacity. They will be permitted to build some capacity of their own (up to 15 per cent of requirements) and will place contracts with generators for the rest. Given that they are not primarily producers of electricity and that they are in contact with consumers, they are likely to be much more orientated towards marketing than the CEGB. As Mr Michael Spicer (Parliamentary Under Secretary of State for Energy) said recently of the distributors, "... they will be much closer to the market place than a monopolistic producer which plans in the knowledge that it can incur no penalty if it makes mistakes as the cost effects of its mistakes will be passed straight to the customers" (House of Commons Official Report, Standing Committee E, 21 February 1989, Col. 1170). The distributors are likely, in the words of the Electricity Privatisation White Paper (Inquiry Document S69, para. 32), to "... have stronger incentives to pursue economic schemes for local generation and for managing peak demand, so as to reduce requirements for bulk generating capacity". In other words, rather than building capacity to match projections of demand, the distributors are likely to take a much more active approach to managing demand.

(ii) there is likely to be a great deal of scope for such management. Growth in electricity demand is not an inevitable consequence of a growing economy with advancing technology, as the CEGB's forecasts might appear to indicate. Total sales and the corresponding peak demand are determined also by the pricing and other marketing policies of the industry. Private companies in competition with other private companies and aiming to satisfy shareholders will be more active than the CEGB has been (see 5.10 above) in trying to influence total sales and maximum demand so as to keep down costs. The regulatory rules, which do not necessarily allow costs to be passed on in full, will also provide distributors with an incentive to keep down their costs by finding ways of restricting peak demand.

(iii) to the extent that increases in peak demand do occur, ways of meeting them other than building new capacity are possible. Because of the incentive structure under nationalisation (5.10 above), supply-side schemes to economise on the building of new capacity have not been favoured. For example, although the CEGB has extended the lives of some plant compared with what was originally expected, as Mr Morrow points out (COLA 6, paras. 74 to 81), there is considerable potential for avoiding new construction by further extending plant lives; cost-conscious private operators are likely to exploit such opportunities. Mr Morrow also points out that the CEGB's capacity margin appears to be excessive. Such an excess is another symptom of the monopoly cost-plus industry structure which has existed in the past; it provides a hidden reserve of capacity which can be used in the future. It may also be that the declared net capabilities of many of the CEGB's power stations are under-estimates of the output of which those plants are capable: experience with oil-fired plant during the 1984-85 miners' strike would suggest that to be so.

(iv) another point made by Mr Morrow is that the CEGB has removed some large modern oil-fired plant from its declared net capacity and placed it in 'rotational reserve' (COLA 6, para. 68) The recent under-utilisation of the CEGB's relatively modern oil-fired capacity is an important factor when future capacity provision is being considered. Five large oil stations (Fawley, Grain, Ince, Littlebrook and Pembroke) with a combined capacity of over 8 GW operated at an average load factor of only about 13 per cent in 1987-88. The reasons for such under-utilisation appear to have been largely political - to protect the British coal industry by means of the government-condoned 'Joint Understandings' under which the CEGB has undertaken to take most of its fossil fuel supplies from the British Coal Corporation. Under-utilisation is unlikely to persist beyond privatisation. The immediate effect of greater use of oil capacity will be to reduce the industry's coal burn. However, when questions of capacity expansion arise in the future it is likely for many years to seem more attractive to keep these oil-fired plants in operation rather than to construct new plants. The costs of the oil plant are sunk; thus when contemplating capacity expansion cost-conscious private companies will compare the avoidable costs of the alternatives - capital costs plus the operating costs of new plant with the operating costs only of their existing plant. Thus they will have a strong incentive to keep oil plant running rather than build new plant unless oil prices rise very sharply again. I understand that the CEGB's successors are already negotiating fuel oil contracts for these stations.

6.3 I would therefore contend that after privatisation, one can reasonably expect that, for any given level of expected maximum demand, the need for new capacity will be seen to be less than the CEGB now claims because:

- a) some capacity recently closed will be re-opened;
- b) some plant still operating but nearing the end of its CEGB-assigned life will be kept open for longer;
- c) reserve capacity will be reduced;
- d) some capacity may be uprated;
- e) there will be much increased use of existing oil-fired capacity.

6.4 In summary, privatisation will reveal a number of 'inefficiencies' which have resulted from the past structure of the industry. More cost-conscious operators working in a more commercial, less politicised environment, will make better use of the industry's existing assets and will therefore perceive a much smaller requirement for new capacity than the CEGB has suggested to this Inquiry.

7. WHY THE CEGB'S CASE IS UNSATISFACTORY

7.1 I would summarise my views on why the CEGB's case on capacity requirement grounds is unsatisfactory as follows:

- (i) the demand and load forecasting methods are inadequate to demonstrate 'need' to this Inquiry. They are unduly dependent on judgment and little attempt appears to be made to establish explicit relationships which could be checked by outside observers. This approach

to forecasting appears to be primarily a function of the monopoly position the Board has enjoyed for so long; a dominant monopoly which can pass its costs on to consumers has little incentive to devote large resources to demand forecasting and demand management. It is concerned to supply more of its product from year to year. Forecasts which arise from such pre-privatisation motivations are irrelevant to the assessment of 'need' for a post-privatisation power station. The Board's belief that privatisation will make no difference to demand is significant in demonstrating how inappropriate its forecasts are: in my view it signifies that the Board's forecasters have assumed away the impact of privatisation, not that the impact will actually be close to zero.

(ii) forecasts based largely on judgment might be of some value to the Inquiry if the CEGB were to be the body responsible for building power stations in future. But it will not be.

(iii) the forecasts presented to the Inquiry show the capacity requirement (measured by restricted SMD) increasing at the same rate as total electricity sales. That might have been so had the CEGB remained in being as dominant generator. It is most unlikely to be so under a regime where there are a number of distributors making contracts with a number of generators. Under the regulatory scheme, the distributors will not automatically be able to pass on all their costs. Consequently they will have a much stronger incentive than the CEGB has had to find ways of minimising the amount of capacity needed for any given level of electricity sales.

(iv) in addition to the potential for demand management, there is almost certainly a 'hidden reserve' of capacity within the existing CEGB system which will be revealed after privatisation. The reserve margin seems excessive and there are good prospects for extending plant lives, increasing the use made of oil plant, re-opening recently closed power stations and uprating some capacity.

(v) to the extent that any new capacity is required, there is no clear link between that requirement and capacity provision by the CEGB's successors. After privatisation, distributors will be able to contract with any generator they wish (in England and Wales or elsewhere) and generate up to 15 per cent of their own electricity requirements. Thus an increase in capacity could be achieved without any new stations being built by National Power or by PowerGen. It could be provided by new entrants to generation in Britain: the Secretary of State has announced that he already knows of "... nearly 20 proposed independent power generation projects which would amount to over 10 per cent of national needs." (The Financial Times, 13 December 1988, page 12). Or imports from Scotland or the Continent could be increased. As Mr Morrow explains in COLA 6 (para. 91) and COLA 7 (para. 126) the nature of the present CEGB system may well result in the early capacity needs of the privatised industry being met by relatively small gas turbine and combined cycle plant so that there is no more new base load plant required until well into the next century. Plainly, in such circumstances, one cannot accept the assumption, which appears to be implicit in the CEGB's case, that in future capacity will be built by the CEGB's successors just as, in the past, it has been built by the CEGB.

(vi) there is an even more tenuous connection between the case made by the CEGB on capacity need grounds and the application to build the proposed Hinkley Point 'C'. The connection is indeed so remote that I cannot see that it can reasonably be taken into account at this Inquiry. The CEGB itself appears to regard 'capacity need' as a subsidiary argument (Transcript, Day 19, page 4, B to H).

8. CONCLUSIONS

8.1 I would conclude that the CEGB has not established a 'need' for the proposed Hinkley Point 'C'. Moreover, since 'need' has not been demonstrated, there is no case for arguing that the Hinkley proposal should be approved so as to provide an option for a future power generation company. In the absence of a plausible 'need' case, there are no benefits to offset against the costs of establishing an option for a particular power station. Those costs would include the creation of a barrier to entry into electricity generation (because some of the costs of the 'option' station would be sunk), the costs imposed on those who do not want the station, and the creation of uncertainty for the local community which does not know whether or not the proposed station will be built.

8.2 Furthermore, the time is already past when there was any need for centralised forecasts of electricity sales and maximum demand of the kind produced by the CEGB at this Inquiry. As Mr Michael Spicer has explained, "... the centralised planning systems under which the industry largely operates at present cannot be said to have produced an optimised distribution or capacity of generation. Manifestly, the national planners have consistently got it wrong about the capacity required for generation in this country ... in the last several years there has been great over-capacity as the result of centralised planning ... central planners make big mistakes. By definition, they deal with big problems but we are proposing a market-oriented system in which there will be a multiplicity of planners." (House of Commons Official Report, Standing Committee E, 21 February 1989, Cols. 1169-1170).

8.3 Under the more decentralised electricity supply industry which Mr Spicer was describing and which is already beginning to emerge, what will establish 'need' is a contract which a generator has with a distributor not the central plan of the present sole generator. As these contracts are in process of being negotiated, it seems most inopportune to anticipate the results by accepting the plans of the present single generator which will have no responsibility for power station construction and operation in future. It would be better to await the outcome rather than relying on 'business as usual' forecasts by the CEGB which can hardly be credible considering that its business existence is about to end.

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