PREM 19/735

Energy Policy
Nuclear Power Policy
Meetings of the International Energy Authority (IEA).
PART 7

ENERGY

Part 1: May 1979

Part 7: Jan 1982

PREM 19/1435

Referred to	Date	Referred to	Date	Referred to	Date	Referred to	Date
2.2.82		30.9.82					
9.2.82		1.10.82					
15.2.82		5.10.82					
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2.8.82							
16.8.82							

PART 7 ends:-

E (82) 21st conclusions item 2 of 14/10/82

PART 8 begins:-

S/S Energy to PM + att 27/10/82

TO BE RETAINED AS TOP ENCLOSURE

Cabinet / Cabinet Committee Documents

Reference	Date
CC(82) 26th Conclusions, Minute 1	13.5.82
E(82) 67	8.10.82
E(82) 69	11.10.82
E(82) 66	11.10.82
E(82) 70	12.10.82
E(82) 21st Meeting, Minute 2	14.10.82

The documents listed above, which were enclosed on this file, have been removed and destroyed. Such documents are the responsibility of the Cabinet Office. When released they are available in the appropriate **CAB** (CABINET OFFICE) CLASSES

Signed A Wayland Date 23 August 2012

PREM Records Team

Published Papers

The following published paper(s) enclosed on this file have been removed and destroyed. Copies may be found elsewhere in The National Archives.

1. Oil and Gas (Enterprise) Bill, HMSO, 23 March 1982

2. Sizewell B: a review by HM Nuclear Installations Inspectorate of the pre-construction safety report
ISBN 0 11 883652 8
HMSO, July 1982

Signed O Wayland Date 23 August 2012

PREM Records Team

Energy

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P.0871

PRIME MINISTER

Fast Reactor Policy:
E(82)66,67,69 and 70.

BACKGROUND

In December 1980 the Committee considered a recommendation from the then Secretary of State for Energy that he should try to reach an agreement with the French and Germans on the development of a fast breeder reactor. The Committee decided that the time was not ripe for this and asked for a full evaluation of the main policy options (E(80)46th Meeting, Item 1).

FLAG A

FLAG B

2. The memorandum by the Secretary of State for Energy (E(82)67) examines a range of policy options. It suggests that options based on a large scale independent or collaborative fast breeder programme and involving an early move towards construction of a commercial demonstration fast reactor (CDFR) should be ruled out. It asks for authority to put a proposition to the Atomic Energy Authority (AEA) on the following lines:

(a) The cost of the fast breeder programme (operation of the prototype fast reactor (PFR) at Dounreay in Caithness, plus research and development) should be reduced to £60 million a year by the late 1980s, compared with the present £100 to £110 million a year. The programme would be directed mainly towards improving current design concepts, reducing capital costs, and improving operating economics.

(b) There would be no intention of proceeding to a CDFR in the foreseeable future.

The AEA would be asked to advise what could be bought with the money, plus any contribution from the electricity supply industry or the nuclear plant

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industry; and what scope it would provide for international collaboration. On the basis of the advice, the Secretary of State for Energy would come forward with definitive recommendations: he implies that if the programme did not seem cost-effective he would recommend more drastic reductions in expenditure which would effectively remove the United Kingdom from the independent development of fast breeder technology. He proposes to make an early public statement of the Government's policy.

FLAG C
FLAG D

3. The recommendations in E(82)67 are broadly endorsed in the note by the Central Policy Review Staff (E(82)66). They are also supported in the minute by the Chief Scientist, CPRS, circulated with E(82)70; but this suggests a statement putting less emphasis on cost reduction and more on our desire to seek international collaboration.

FLAG E

4. The note by the Secretary of State for Scotland (E(82)69) also agrees with the main line of argument in E(82)67, but has two reservations. First he suggests that to reduce the size of the programme to £60 million a year may be to go too far and that it might have serious effects on the economy of Caithness. He argues that it is important to be sure that the money spent on the fast breeder programme is enough to achieve worthwhile results and to ensure that we are taken seriously by other countries as possible collaborative partners. He therefore indicates that he would prefer a programme of £70 million to £80 million which the AEA Chairman has said is the minimum practical level. He also thinks it undesirable to say that there is no intention to build a CDFR in the near future. His preferred formulation is that it would be premature to set any date for building a CDFR.

MAIN ISSUES

5. The papers before the Committee are voluminous; and it will hardly be practical to go into the details of the seven or more options discussed in them. Nor is the Secretary of State for Energy inviting the Committee to do so: he is asking only for authority to put a proposition to the AEA and to announce that he is doing so. It would probably be most useful for the Committee to discuss the following questions:

i. whether the United Kingdom's policy on fast breeder reactors should be aimed at:

a. eventually buying in at least the bulk of the technology from overseas, or

b. developing at least a large part of it ourselves, or

c. keeping our options open so far as possible;

ii. whether the course recommended by the Secretary of State for Energy seems likely to achieve the desired aim;

iii. whether the Government should make an early statement of its intentions and, if so, what it should say.

Technology: under licence or home-grown?

6. In favour of the UK's continuing to develop fast breeder technology, it can be argued that the fast breeder process is intrinsically far more efficient than the thermal nuclear cycle; that it will provide considerable economic benefits and security of fuel supplies; that the UK will, sooner or later, need the technology; and that it is unsafe to rely on being able to acquire the technology from abroad at an acceptable price - or at all.

7. Against this, it can be said that the fast breeder process is unlikely to be commercial for at least 30 years, and quite possibly a lot longer; the UK might therefore find itself investing huge sums for very little return. As for the prospects of licensing, there are very likely to be at least two competing suppliers (the USA and France); and there is no more reason to suppose that it will be impossible to license fast breeder technology than it has been to license PWRs.

8. The Secretary of State describes four main options:

Option I

Run-down of fast reactor research and development; closure of PFR. This is a 'minimum cost' option which would take the UK out of the development of fast breeder technology.

Option II

Maintenance of PFR in operation, but cut of 50 per cent in the associated R & D programme. This would also take the UK out of

developing independent technology; but if and when the time came to buy technology from overseas, the UK would be an 'informed customer'.

Option III

Proceeding towards CDFR in collaboration with other countries.

Option IV

Proceeding independently to a CDFR.

9. The estimated costs of these options, as set out in E(82)67, are summarised in the Annex to this minute. In fact however the strategic choice cannot sensibly be arrived at by studying the figures. Essentially a judgement has to be made about the time when a fast reactor will be more economic than a PWR (this depends on a wide range of assumptions about the capital costs of fast reactors and the price of uranium) and about whether, when that time comes, it will prove to have been cheaper to have been participating in developing the new technology rather than to buy it in. It is very difficult to make such a judgement at this stage. The Committee may therefore feel that the right broad approach is to keep the UK's options open for as long as possible, so far as this can be done at tolerable cost. If this is the general view it should provide a basis for assessing the Secretary of State for Energy's proposals and any alternative proposals which are put forward.

Assessment of the Secretary of State's proposals

10. In practice the Secretary of State for Energy is putting forward none of the main Options I to IV. He argues that there is no basis for proceeding with III or IV because they both involve the expense of building a CDFR. He is also reluctant to contemplate Option I at this stage because of the risk which would be involved. He is therefore putting off making firm proposals until he has sought further advice from industry. The basis on which he intends to seek this advice is to put a limit on the resources available of £60 million a year in the late 1980s. This is a smaller sum than would be required for Option II which is said to have only the limited objective of enabling the UK to be an "informed purchaser" of

licensed technology when the time comes. He implies however that he hopes that, following his consultations with industry, expenditure of this magnitude, together with contributions from the Generating Boards, NNC and BNFL should give the UK some worthwhile participation in the development of fast reactor technology and should provide the basis for some international cooperation. If such a limited programme does not seem worthwhile, he is likely to propose instead a minimum cost approach on the lines of Option I.

11. Most members of the Committee are likely to agree that the right course is not to adopt any of the Options I to IV at this stage but to defer a decision until there has been further discussion with the industry. Dispute is likely to arise on the precise basis for the consultation, and in particular:

i. whether the Government should commit itself finally to expenditure of no more than £60 million a year or should be willing to contemplate a somewhat higher figure (£70 million or £80 million) as the Secretary of State for Scotland would prefer, if this is necessary to achieve worthwhile results.

ii. whether the Government should make it clear that it is ruling out the construction of a CDFR for the foreseeable future.

iii. whether the assumption should be that, if expenditure of £60 million a year is unlikely to achieve worthwhile results, the alternative would be to pull out of fast reactor technology altogether (Option I).

The Committee's view will depend on how far they want to go in trying to keep options open.

12. We understand that Treasury Ministers are likely to argue that the figure of £60 million a year in the late 1980s should be regarded as a firm limit; and that if the AEA advise that it is not possible to mount a programme within that sum which will achieve the ends outlined by the Secretary of State for Energy, the Government should decide in favour of

Option I. This is logical, if the Committee is willing to agree now that the country should spend no more than £60 million a year in order to keep open the option of playing a significant role in the development of fast breeder technology. If the Committee is not disposed to fix an arbitrary limit of this kind, it would be better to agree to review the position when the Secretary of State for Energy has carried out his consultations with the AEA.

Statement of Government intentions

13. Any statement will need to be consistent with the basis on which it is agreed that the Secretary of State for Energy should enter into consultations with the industry. If his proposals are approved as they stand, it would be appropriate to authorise him to make a statement on the lines proposed in paragraph 19 of E(82)67 that the Government is slowing down the fast reactor programme with no intention to build a CDFR in the near future, but that detailed decisions on the programme will be taken in the light of further advice from the industry and further discussions with potential partners. If however the Committee want to enter into the consultations with the options left more open than the Secretary of State for Energy envisages, this would point to a holding statement about a continuing review of fast reactor policy, with more emphasis, as the Chief Scientist CPRS, would prefer, on the possible scope for international cooperation and omitting references to any firm decision to run down the programme and to ruling out the construction of a CDFR in the near future. It would be necessary however to avoid arousing expectations since the Government might eventually have to adopt a minimum cost approach.

14. There is in any case a particular point about timing. The Anglo-French Summit is due to take place on 4 and 5 November. If the Committee considers that there should be a statement to the effect that we do not intend to build a CDFR for some time, the French may take this as a rejection of collaboration with them. There may be a case for deferring an announcement of this kind until after the Summit.

15. You will no doubt wish to invite the Secretary of State for Energy to circulate a draft of any statement to the Committee.

HANDLING

16. You will wish to ask the Secretary of State for Energy, the Secretary of State for Scotland and Mr Sparrow to introduce their memoranda. The Chief Secretary, Treasury will wish to comment on the public expenditure aspects. The Foreign and Commonwealth Secretary will be able to advise on the international aspects, and particularly on relations with the French. The Secretary of State for Industry may have comments on the wider industrial implications.

CONCLUSIONS

17. You will wish the Committee to reach conclusions on the following:

i. whether it is clear at this stage that the United Kingdom's fast reactor policy should be to rely eventually on bought-in technology, to develop at least part of the technology ourselves, or to try and keep our options open for the time being;

ii. in the light of i., whether the Secretary of State for Energy should be authorised to enter into consultations with the industry on the basis outlined in paragraph 17 of E(82)67 or on some different basis;

iii. whether, when, and in what terms an announcement should be made of the Government's intentions.

PLG

P L GREGSON

13 October 1982

ANNEX

Costs of Options I-IV

£ million at September 1981 prices

	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-93	1993-98	1999-2003	TOTAL
Option I (excluding redundancy costs)	108	70	53	36	29	31	53	25	25	430
Redundancy costs		17	44	19	18	20	63	20	2	203
Option II (excluding redundancy costs)	108	84	72	66	68	69	305(a)	220(a)	78(a)	1070(a)
Redundancy costs		8	9	10	9	7	25			68
Option IV (net of credit for PWR operations) (b)	108	103	102	105	143	155	518	163	103	1500
Option III	As Option IV but reduced by total of 300 for assumed credit from collaborative partner.									

Notes

(a) Depending on programme decisions.

(b) The figures for Option III and IV exclude the net cost of the CDFR ; this is estimated at 520-1820, the range reflecting the possibility that the Electricity Boards might buy the electricity generated and be able to postpone construction of a thermal station.

Ref: A09752

Prime Minister

MLS 13/10

PERSONAL AND CONFIDENTIAL

PRIME MINISTER

Fast Reactor Policy

You may like to know that Sir Walter Marshall takes the view (as I understand it) that the course of action recommended by the Secretary of State for Energy would be viable and sensible on the basis of a cost of £60 million a year by the late 1980's; that any figure less than that would not make much sense, in terms of keeping international options and possibilities open, and that it would therefore be preferable to discontinue the programme rather than continue it on the basis of a smaller figure; and that it is important that the Government should now take a decision rather than let uncertainty run on.

Approved by
Robert Armstrong
and signed in his absence.

13th October 1982

PERSONAL AND CONFIDENTIAL

10 DOWNING STREET

Prime Minister

To note Bernard's view on presentation.

MCS 12/10

Ian Lobban

Jane Reading

I would like you to reflect my view that the DTI's proposed presentation is too negative and that I support Lord Sainsbury's amendment.

File

CONFIDENTIAL

10 DOWNING STREET

From the Private Secretary

11 October 1982

FAST BREEDER REACTOR POLICY

The Prime Minister was grateful for your note of 7 October.

You suggested that it might be useful if this was circulated to the Members of E Committee. The Prime Minister agrees, and I would be grateful if you would make the necessary arrangements.

I am sending a copy of this letter to Richard Hatfield (Cabinet Office) and Gerry Spence (CPRS).

M. C. SCHOLAR

Dr. R.B. Nicholson,
Cabinet Office.

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ENERGY cc

NBPM

MCJ 12/10

SECRETARY OF STATE FOR ENERGY
THAMES HOUSE SOUTH
MILLBANK LONDON SW1P 4QJ
01-211 6402

The Rt Hon Francis Pym MC MP
Secretary of State for Foreign
& Commonwealth Affairs
FCO
King Charles Street
London SW1

11 October 1982

Dear Secretary of State,

ENERGY SUPPLY PROJECTIONS

Thank you for your minute of 27 September.

My reasons for not making new Government supply projections for coal, gas and oil are that they are unnecessary, unreliable, and would give the Government nothing but trouble domestically.

However, I recognise the sensitivity of the US to the IEA's gas study and agree that we must find a way to participate in it as constructively as possible. What I propose is that in explaining our attitude towards making supply projections, my officials should stress to the IEA that we are nevertheless anxious that this study should proceed in a way that commands confidence. We should offer to discuss what data we have with the IEA, on a confidential basis, so as to enable the IEA Secretariat to produce their own estimate of UK gas supply on as informed a basis as possible. We should suggest that the IEA also spoke to BGC and to other gas producers with licences on the UK Continental Shelf. This Department's 1979 projections may also be of some help.

I am copying this to members of E Committee and Sir Robert Armstrong.

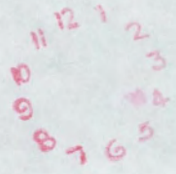
Yours sincerely

N.L.W.

NIGEL LAWSON

(Approved by the Secretary of State and signed in his absence.)

Energy, Policy, Pt 7



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Prime Minister

Would it not be helpful if E colleagues, too, had this note before the discussion at E on Thursday (Mr Nicholson thinks so)?

W.0621

PRIME MINISTER

FAST BREEDER REACTOR POLICY

The discussions of the Working Group on Technology, Growth and Employment set up by Heads of State at the Versailles Summit have included material which is relevant to the policy decision on the United Kingdom Fast Breeder Reactor programme to be discussed at "E" on 14 October. MCS 8/10

2. There is substantial international disagreement on the likely relative costs of FBR electricity to PWR electricity at current uranium prices. The French claim that the ratio is already down to 1.3 so that a small increase in uranium prices would make FBR electricity the cheaper. The Americans claim that the ratio is about 3. Differences in the assumed capital cost of an FBR station probably account for much of this variation but the extrapolated cost of PWR electricity, the accounting treatment of the power station capital cost, and the allocation of future FBR R & D expenditure also contribute.

3. The American position is that the unexpectedly low uranium price means that the commercial switch from PWR to FBR is further away than had been anticipated. The additional time available, coupled with the high capital cost of present FBR designs, suggest that a new engineering R & D programme aimed at a fundamental improvement in the reactor core design is desirable.

4. The Americans are therefore proposing an international collaborative project on FBR core design to the Versailles Working Group. They seem confident of getting the Japanese in and are pushing hard to have our support as well. They believe that

USA/UK/Japan collaboration would subsequently bring Germany in as well, leaving the French with an expensive programme in obsolescent technology which they will be too proud to drop.

5. Whether or not the American prognosis is right, the Versailles Working Group (which has to report by 31 December) will almost certainly influence the pattern of international collaboration on Fast Reactors. Thus the Secretary of State's proposal to ask UKAEA to re-examine the scope for international collaboration as a means of making the best possible use of the proposed reduced level of funding is very timely.

6. However it is important not to prejudice the UKAEA's negotiating position over the next few months by making too negative a statement in Parliament. Rather than concentrating on cost reduction, I suggest that the statement has the following components:

(a) The UK's "indigenous reserves" of uranium from the thermal reactor programme are comparable with our fossil fuel reserves if we use FBR technology, hence FBR is an attractive future source of power.

(b) FBR costs will not be lower than thermal reactor costs until the next century - therefore it makes sense to stretch out our R & D programme and not build a CDFR at present.

(c) Our FBR technology is highly regarded abroad and we propose to seek R & D partnerships with one or more other countries as a means of getting maximum benefit from our continuing R & D programme.

RBN.

ROBIN B NICHOLSON
Chief Scientist

cc: Sir R Armstrong
Mr Sparrow

Cabinet Office
7 October 1982

w/o Energy

DEPARTMENT OF INDUSTRY
ASHDOWN HOUSE
123 VICTORIA STREET
LONDON SW1E 6RB
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JU846

Secretary of State for Industry

7 October 1982

NBPM
MLS 8/10

The Rt Hon Nigel Lawson MP
Secretary of State for Energy
Thames House South
Millbank
London SW1

Dear Nigel,

SIZEWELL B

Thank you for sending me copies of your letter to the Chancellor, enclosing the energy projections and the Department of Energy Proof of Evidence. I am content that they should both go forward as inputs to the Sizewell enquiry.

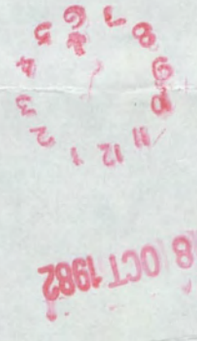
I attach considerable importance to the argument that nuclear power can help to bring electricity prices down and improve industrial competitiveness. No doubt we will want to develop this during the course of the enquiry and also to cover the implications of a nuclear programme for UK equipment suppliers. Officials of our two Departments are considering how these issues can best be handled.

I am copying this to the recipients of your letter.

Yours ever

Patrick

Energy: Policy, Pt 7



NBPM

cc

DEPARTMENT OF ENERGY
JAMES HOUSE SOUTH
MILLBANK
LONDON SW1P 4QJ
Direct Line 01-211 3390
Switchboard 01 211 3000

Mus. S/Ro

ENERGY

PARLIAMENTARY UNDER
SECRETARY OF STATE

The Rt Hon Tom King MP
Minister for Local Government
& Environmental Services
2 Marsham Street
London SW1

5 October 1982

Dear Minister

Thank you for your letter of 1 October to Nigel Lawson commenting on the Department's latest energy projections.

I understand that, following discussions between our officials, the final text is acceptable to you.

I am copying this letter and the final text of our proof of evidence and the projections, as submitted to the Sizewell Inquiry, to members of 'E' Committee and to Sir Robert Armstrong.

yours sincerely

Andrew Frew

(M) DAVID MELLOR

Approved by Mr Mellor and signed
in his absence

Energy, Policy, A47

DEPARTMENT OF ENERGY

PROOF OF EVIDENCE

FOR THE

SIZEWELL 'B' PUBLIC INQUIRY

DEPARTMENT OF ENERGY
OCTOBER 1982

CONTENTS

DEPARTMENT OF ENERGY PROOF OF EVIDENCE
FOR THE SIZEWELL 'B' INQUIRY

This proof of evidence will be presented by Mr R J Priddle, an Under-Secretary in the Department of Energy and Head of the Energy Policy Division.

1 The Department of Energy's responsibilities derive from the duties placed on the Secretary of State by Parliament. These are generally described in the Ministry of Fuel and Power Act 1945 as extended by the Continental Shelf Act 1964. These make the Secretary of State for Energy responsible "for securing the effective and co-ordinated development of coal, petroleum and other minerals and sources of fuel and power in Great Britain and in the Continental Shelf and for promoting economy and efficiency in the supply, distribution, use and consumption of fuel and power". In the first section, this proof of evidence describes the general policy framed to discharge these responsibilities. In the second section, and against this background, it explains the Government's approach to electricity supply and the role of thermal nuclear power within the electricity supply system.

Energy Supply and Demand: the Government's approach

2 A major aim of the Government's overall economic policy is to set the right conditions to enable the supply side of the economy to operate more competitively and efficiently. A crucial element of that policy is to remove, where practicable, obstacles to the free operation of market forces throughout the economy. In the energy sector, where available resources and distribution networks are concentrated substantially in the hands of public sector monopolies, the market is far from free and competitive. The thrust of Government policy in this sector therefore is to remove market distortions where possible or otherwise to seek to ensure that the energy market operates as nearly as possible as a free market. Such an energy market will regulate energy supply and demand with greater success and efficiency than relying on central planning as the means of ensuring that UK supply meets demand.

/3 Steps which

3 Steps which the Government is taking to this end include transferring functions from the public to the private sector, reducing the monopoly powers of the nationalised industries and, where those industries are not and cannot by their nature be fully exposed to market forces, introducing alternative disciplines. Examples of this policy are the sale of Britoil, the weakening of the British Gas Corporation's monopoly and the investigations of efficiency conducted on behalf of the Government by the MMC and outside consultants.

4 The facts that we operate in a world market not only for oil but increasingly for coal and gas, and that that market is unstable and not greatly susceptible to Government influence underline the Government view that the UK cannot work to a set blue print of energy development. For example, a sharp escalation in the price of oil enhances demand for other fuels and requires a flexible response. Access to international markets means that energy supply investment options need not be constrained by a requirement exactly to match UK energy production to energy demand.

5 The public sector energy industries in the UK have their own responsibility for drawing up plans designed to sustain their supply obligations. The Government, in discharge of its responsibilities for public expenditure, evaluates these plans in the light of its own knowledge, but without attempting to match the detailed expertise of the industries. Energy projections have a role in testing energy supply investment proposals; and the latest set of the Department of Energy's projections is attached at Annex 1. But there are many uncertainties in such projections. They are not forecasts and they need to be continually reviewed and revised to take account of changing circumstances.

6 It is central to this market-oriented approach that energy should be priced realistically since interaction between supply and demand is mainly determined by price. If prices are artificially low, energy is used wastefully and consumers lack the

incentive to invest in efficiency. If they are too high, consumers suffer needlessly, while producers are encouraged to invest in unnecessary new capacity. To minimise these distortions, energy pricing is discussed with the nationalised industries in formulating their financial targets, on the basis that prices should reflect market pressures where reasonably open markets exist, or the costs of supply in other cases. The Government considers it is then up to the consumer to rank his own investment priorities in the light of prevailing prices. Energy efficiency and supply investments are both necessary, but the Government does not seek to take to itself the decisions of millions of consumers. When the Government has to assess investment in supply, full account is taken of possible future price movements and technical change, and the consequential effects on demand.

Electricity

7 As with other fuels, the Government's objectives for electricity are that there should be secure supplies, provided to the consumer at the lowest possible cost. The Government's approach to achieving these objectives differs in some respects from its approach to the other energy industries. With electricity, it is more difficult - and will continue to be so - to sell surpluses, or make good shortfalls in supply, since the scope for international trade is limited to sales through interconnectors between adjacent national grids; and there are a number of uses where electricity is not interchangeable with other fuels.

8 The Central Electricity Generating Board, who have a statutory duty '... to develop and maintain an efficient, co-ordinated and economical system of supply of electricity in bulk for all parts of England and Wales, ...' have to take account of these limitations in their planning. So too does the Government in considering the industry's capital programme.

/9 Against this

9 Against this background, the Government seeks to ensure that the electricity supply industry makes as thorough and realistic an appraisal of future demand as possible; that its plans offer the prospect of meeting that demand as economically as possible while assuring security of supply and making an adequate return on investment; and that public expenditure considerations are properly taken into account. The Department does not duplicate the CEGB's calculations. But it must satisfy itself about the validity of the Board's methodology and in the case of major investments subject to the Department's approval to test the robustness of the proposals to different assumptions.

10 The energy crises of the last 10 years have shown the danger of over-dependence on one fuel, and the wisdom of a sensible degree of diversity of supply. Despite considerable research work in the UK and internationally on alternative and/or renewable sources of energy, on fast reactors, and on nuclear fusion, and the Government's encouragement of increased private generation and economic combined heat and power schemes, the Government considers that the only available and economic options for new secure base-load generating capacity at present are coal-fired or thermal nuclear power stations.

11 In 1981/82, 83% of the CEGB's generation was from coal - which also dominated base-load generation. By comparison nuclear accounted for some 12%. The nuclear output will increase, probably to around 20%, when those nuclear stations now under construction are fully commissioned. However unless new stations are ordered in the 1980s the nuclear power component will progressively decline as older nuclear stations are retired.

12 As was made clear in last year's White Paper on Nuclear Power (Cmnd 8317, published in July 1981) the Government considers it prudent for the country to have a range of supply options. In this context it sees an important and necessary role for nuclear power which will develop in the years ahead as older electricity generating plant is retired. The Government accordingly expects the electricity supply industry to pay due regard in its planning

/to the need

to the need for diversity and security in supply, including an appropriate nuclear component.

13 Nuclear power has the potential to produce electricity more cheaply than fossil fuels provided that new power stations can be built to time and cost. This is of importance, not only to individual electricity consumers but - through its influence on industrial competitiveness - to the economy as a whole.

14 Safety is paramount. The operational responsibility rests with the CEGB. It is the responsibility of the Nuclear Installations Inspectorate as part of the Health and Safety Executive to decide whether or not a new power station has been designed and built to the necessary standards and can be operated safely.

15 Government policy is to encourage the electricity industry to ensure that there is a reliable, safe and cost-effective reactor system available for ordering as necessary. In 1977, the CEGB declared its intention of establishing the PWR as a valid option; this intention was endorsed by the previous administration; and the present Government, in confirming its agreement to this in 1979, took the view that subject to the necessary consents and safety clearances, a PWR should be the next nuclear power station order.

16 This general statement of policy in no way pre-empts the particular decision on the proposed Sizewell 'B' power station; and the Government welcomes the examination at the Public Inquiry of the issues set out in the Rule 5 Statement.

ANNEX

ENERGY PROJECTIONS 1982

I INTRODUCTION

1. These Projections have been prepared as part of the Department of Energy's evidence for the Sizewell Inquiry. They explore a reasonably wide range of possible developments for UK energy demand into the first decade of the next century. This range is based on a number of combinations of economic assumptions which have been chosen to point up the different ways in which that demand might develop.

2. The assumptions themselves - and the Projections developed from them - are necessarily very uncertain. The assumptions include: the level of world economic activity; the internationally traded prices of oil, coal and gas; the growth and structure of the UK economy, in particular the balance between the manufacturing and service sectors.

3. The last set of Energy Projections was published by the Department in December 1979. Since that time prospects for economic growth have become less optimistic and the world oil market has weakened. The recession has significantly affected the structure of the British economy. The background to the current round of Projections is therefore very different from that which underlay the 1979 exercise.

4. The changes which have occurred over the last three years underline the importance of looking at a range of possible futures, and of the dangers inherent in trying to select any one of them. Take for instance the higher economic growth rate tested over the 30 year period 1980-2010. On the one hand, although it was an exception in British economic history, such growth was achieved in the UK in the 25 years after the Second World War. On the other hand, seen against what has occurred in the last 10 years, it could be regarded as unrealistically high. But that is not to say that any of the other cases studied should be regarded as a central or preferred case. They are each merely useful points on the range studied, and serve to illustrate the radical effect of change on only one or two key assumptions.

5. Not only is it unwise to take a single view of the future, it is also unnecessary to envisage supplying the country's energy needs totally from domestic production. This country has a long history as a trading nation. It may prove economic to import some fuels which are expensive to produce at home and to plan for profitable exports where suitable opportunities arise. Furthermore, future mis-matches of demand and supply

for tradable energy products may be accommodated by imports and exports at world prices. For this reason it is unnecessary to produce projections for future supplies of the primary fuels. Individual investments in the nationalised industries producing these fuels will be considered on an individual basis in the circumstances then current to ensure that they earn a satisfactory return on capital.

6. Opportunities for international trade in electricity are limited, although these should not be completely discounted. Unexpected future mismatches of demand and supply of electricity are not easily accommodated by imports or exports at the margin, unlike other more easily tradable energy products. Supply investment for electricity therefore needs to be set against the background of projections of electricity demand, to minimise the risk of significant over or under supply. Electricity demand must be analysed within the demand for all types of fuel.

7. Although government policies can have some impact, most of the decisions which shape the future level and structure of energy demand are determined by market forces. Consumers decide their choice of fuel and its efficiency in use largely in the light of their income or level of activity and the fuel and equipment prices in the market. The projection method takes into account the effects of energy prices on energy use and corresponding increases in the efficiency of energy consumption.

8. The energy projections set out in this paper present the Department of Energy's present view on possible energy futures, as a framework for policy considerations in government.

II PROJECTION METHOD

9. The methods employed in preparing the energy projections are outlined in Appendix I to this paper. A number of major modifications have been made to the methods used for earlier projection exercises. The most important development has been the redesign and estimation of the energy demand calculation in which market prices now play an explicit role, along with economic activity, in determining the demands for each fuel in each consuming sector.

10. For a given set of assumptions, including those for fossil fuel prices, detailed projections of demand for the main fuels (solid fuel, oil, gas and electricity) have been prepared for each of the consuming sectors - domestic, iron and steel, other industry, transport, other consumers and non-energy uses. The consequences for the supply of electricity have then been prepared. Equilibrium is established between the supply and demand for electricity at the calculated electricity prices in each projection year using an iterative calculation.

11. A calculation of this type, however complex, is inevitably a highly simplified description of how the real world is likely to develop. The structure of the calculation and the many assumptions used in it are important sources of uncertainty in the projections presented in this Annex.

Energy Conservation

12. The explicit role of market prices in determing energy demand removes the need for a separate allowance for energy conservation. No attempt is made, in preparing the projections, to account for the effects of individual conservation measures.

13. The method used for calculating energy demand has two important features. There is a non-price effect which arises mainly as a result of technical change. If fuel prices rise at the same rate as general price inflation (i.e. constant real fuel prices) then total demand for energy tends to rise less quickly than economic activity (GDP). The second feature involves additional energy savings as fuel prices rise faster than general inflation. In this case other inputs (such as capital for additional insulation or improved boiler controls) are substituted for energy as fuel prices rise relative to other goods. In addition consumers tend to use relatively less energy, to use it more efficiently and to undertake more energy conservation measures, the faster energy prices rise in real terms. In this way the 'price' and 'non-price' components of increasing efficiency in energy use are incorporated into the projections. Quantitative estimates of the reduction in energy use from rising real energy prices in the projections are provided at paragraphs 33-35 below.

III ASSUMPTIONS

14. Projections of future energy demands in the United Kingdom are based on assumptions about world economic activity, world energy prices, real exchange rates and the growth and future structure of the British economy.

15. These assumptions are interdependent. At given future levels of world supplies of energy a faster long-term rate of growth in the world economy will place more pressure on energy supplies and lead to higher energy prices. In addition, the importance of international trade to Britain implies that faster world economic growth will, as in the past, also lead to a higher rate of economic growth in this country.

16. It is sometimes suggested that high world energy prices would prevent the achievement of high rates of economic growth. Although high energy prices are likely to place some constraints on economic activity, the fundamental forces generating economic growth arise, in the main, outside the energy sector. Account has been taken of these factors in choosing assumptions for economic growth and increases in real energy prices. While temporary output losses may follow from world energy price shocks, over the longer term markets will adjust with increased energy conservation, inter-fuel substitution and the discovery and exploitation of new energy supplies on the one hand and with increased absorption and recycling of any financial imbalances on the other.

Energy Price Assumptions

17. However, future levels of world energy supplies and the efficiency with which energy is used world wide are also uncertain and subject to shocks. For this reason two sets of assumptions for fossil fuel prices, at the world level, have been taken. The upper set covers average annual increases between 1980 and 2000 of 2.9% to 5.4% and could accommodate one or more major shocks in world energy markets. The lower set, covering annual average increases of -0.7% to 2.7% a year, is more surprise free and assumes more rational world responses to the need to use energy efficiently. These ranges are expressed as percentage increases in OPEC crude marker prices suitably deflated to 1980 price levels. These crude oil price movements are translated into sterling terms and converted to market prices for petroleum products in the UK using refining and distribution margins.

18. The delivered prices of NCB coal are currently close to the sterling cost of imported coal for most consumers and this relationship is expected to continue. Future paths for world coal prices have been prepared in association with the oil price assumptions. For the low end of both oil price assumption sets, in the medium to long term, world coal prices are based on estimates of the marginal production cost of coal. At higher oil prices in each assumption set world coal prices are expected to be higher than the marginal production costs of coal as a result of competition with oil in end uses.

19. In the long run it is assumed that the price of gas landed in Britain will move broadly in line with prices in West European gas trade which will in turn be related to the prices of competing oil products. Distribution margins are added to the 'beach price' to arrive at final consumer prices. In the short to medium term the path of prices reflects a movement from the present structure towards the longer term prices.

20. Final consumer prices for electricity are calculated in the projections from marginal generating costs based on the other fuel price assumptions. This is a difficult calculation and the projections of electricity prices are particularly uncertain.

21. The detailed price assumptions for all fuels are listed at Table A.

Economic Growth Assumptions

22. Three views of possible future UK economic growth have been adopted. A high rate of 2½% per annum GDP growth is slightly less than that achieved between 1948 and 1972. An intermediate rate of 1½% p.a. GDP growth is close to the long-run average rate of the last 80 years. A low growth assumption of ½% p.a. is broadly similar to that achieved during the depressed conditions since 1973. For each of these views the path of GDP assumes lower growth during the first half of the 1980s and a correspondingly faster rate over the rest of the period to 2000. Beyond 2000 the average growth rate for GDP in each case has been adopted.

Assumptions for Economic and Industrial Structure.

23. For each GDP growth rate path, alternative combinations of more and less energy intensive industries within manufacturing, and of manufacturing and service sectors, can lead to significantly different energy demands. A range of assumptions concerning the outputs of these sectors has been selected to span the greater part of the uncertainty.

24. It should be stressed that these assumptions made by the Department of Energy are purely for the purposes of testing the sensitivity of impacts on energy demand. There is no presumption that the output trends are planned to arise from Government policies or that the Government thinks that these output levels will or should arise in the future.

25. Ideally, an integrated economic model covering the whole economy should be used to investigate alternative economic structures. No such suitable model was found to be available for this purpose. As an alternative, an analysis has been made of the performance of the major energy using industries over past periods of faster and slower economic growth. The results of this analysis have provided, for each GDP growth assumption, both a high and a low assumption for the growth rates of those industries, with the less energy intensive industrial and service sectors making up the assumed future levels of GDP. Both industrial structure assumptions have been adopted for the central GDP growth case yielding two separate projections. The high GDP growth/low energy intensive structure case and the low GDP growth/high energy intensive structure case have been omitted as their energy projections would fall within the range of energy demands of the other cases.

Exchange Rate Assumptions.

26. The exchange rates assumed in these projections should not be regarded as forecasts, but as assumptions about long term trends in the relative real values of different currencies. They are real rates of exchange corrected for differences in rates of inflation of the currencies concerned, and expressed in terms of the real value of the US dollar as it stood in 1980 against an appropriate basket of currencies. The path of this particular real sterling exchange rate over the period 1980 to 2010 will be subject to a number of influences. It may rise or fall with the value of North Sea oil production implying a sensitivity to both the volume of oil production and to real oil prices. More rapid economic growth in the UK tends to be associated with better non-price competitiveness and hence with a higher real effective exchange rate. In the short term the success of the Government's policy in reducing inflation will reduce real effective sterling exchange rates since the lower the price level the lower the real rate corresponding to a given nominal rate. These considerations together with the small reduction which has occurred since 1980, in the real effective sterling exchange rate, form the basis of the exchange rate assumptions used in these projections.

The Projection Cases

27. The separate sets of assumptions which underlie the main projections are set out schematically in Table 1 and are listed in detail in Tables A and B. Eight separate projections are provided, as indicated in Table 1, representing the various combinations of assumptions adopted for world energy prices, UK economic growth and economic and industrial structure. The energy projections for each case presented in this paper are identified by the labels given at the head of Table 1, namely X, YU, YL, Z, A, BU, BL, and C. Thus in Cases X and A, high world economic growth generates high world prices for the traded fossil fuels and contributes to high UK economic growth. The other cases are characterised by corresponding combinations of such assumptions.

TABLE 1

ASSUMPTIONS FOR THE PROJECTIONS CASES.

CASES	X	YU	YL	Z	A	BU	BL	C
World Fossil Fuel price assumptions		High Set				Low Set		
World Oil Price in 2000 $ / bbl	88	65	65	55	52	43	43	27
UK GDP Growth % pa	2½	1½	1½	½	2½	1½	1½	½
UK industrial growth	high	high	low	low	high	high	low	low

IV PROSPECTS FOR ENERGY DEMAND

Final Energy Demand

28. Projections of the total amount of energy delivered to final consumers for the eight projection cases are set out in Table 3. These totals are subdivided into totals for consuming sectors and for fuels in Panels 1 and 2 of Tables C and D at the end of the paper.

29. The projections in Table 3 are determined by the assumptions underlying each case, i.e. by the rate of rise of energy prices in real terms and by the economic growth and industrial structure assumptions. In all cases the average annual rates of growth in total final energy demand over the projection period are substantially less than the assumed GDP growth rates over the same period. These growth rates may be compared with the corresponding rates for the two decades of the 1960s and 1970s set out in Table 2.

TABLE 2

HISTORIC GROWTH IN ENERGY DEMAND ECONOMIC ACTIVITY AND REAL ENERGY PRICES FOR THE UNITED KINGDOM

% pa

	1960-1970	1970-1980
Total final energy	1.34	-0.52
Total primary energy	2.42	-0.52
Gross Domestic Product	2.89	1.6
Manufacturing production (excluding North Sea activity)	2.93	-0.3
Real energy prices		
Domestic[1]	0.1	-0.7
Industrial[2]	-1.0	4.3

1 deflated by retail price index.

2 deflated by wholesale output price index.

30. As can be seen from Table 2 the experience of the last two decades has shown wide variation in the rate of growth of energy demand. The main factors have been the variation in economic growth (GDP), the wide divergence between economic growth and manufacturing production and the rapid rise in real industrial energy prices over the 1970s. However, in the 1970's the cost of energy to domestic consumers was held down, mainly by falls in the real price of gas. The projections of growth in total final energy demand can be seen to fall within the range of the experience of the last two decades.

31. The projections for individual fuels within the totals for final energy demand can be seen in the second panels of Tables C and D. The direct consumption of solid fuel is expected, in the main, to increase over the projection period, except in Case C. In the higher fossil fuel price assumption cases gas consumption increases during the 1980s and then declines over the period to 2010 as its price increases in real terms. However, with lower gas price assumptions in Cases A, BU, BL and C, gas demand rises to 1990 and then mainly remains flat to the end of the projection period. Electricity consumption increases in all the projections apart from Cases C and Z where the increases are small. The direct demand for oil products rises from 1980 in some projection cases and falls in others as the increase in demand for transport purposes offsets substitution out of oil for bulk heating uses to a greater or lesser extent. The direct consumption of biofuels and renewable sources, mainly in the form of solid fuel waste, is assumed to provide a small contribution to final energy use by 2010 in all the cases.

32 The position of gas inthe industrial market is uncertain because it is difficult to take account of the possible effects of the Oil and Gas (Enterprise) Act as it is too early to assess the timing and extent of its impact. The analytical approach used, which is dependent in large part on historical experience, is unable to reflect fully the effect of opening this market to greater competition and, in particular, the removal as a result of the Act of current unsatisfied demand. The results are therefore subject to greater uncertainty than has been the case previously. Further details of the consumption of individual fuels in each of the consuming sectors are provided in Tables E and F. These results are discussed in detail in Appendix II.

TABLE 3

UK FINAL ENERGY DEMAND PROJECTIONS

bn therms

Higher world energy prices	GDP growth rate % pa	1980 actual	1990	2000	2010	Average annual growth 1980-2010 % pa
Case X	2.5	54.8	59.2	63.8	71.4	0.88
YU	1.5		56.7	59.3	62.8	0.45
YL	1.5		55.7	57.0	59.4	0.27
Z	0.5		53.9	51.5	51.4	-0.21
Lower World energy prices						
Case A	2.5	54.8	61.7	69.5	76.8	1.13
BU	1.5		59.3	62.5	65.9	0.61
BL	1.5		58.3	60.1	62.3	0.43
C	0.5		56.7	56.1	55.3	0.03

Effects of Rising Real Energy Prices on Energy Demand.

33. An assessment has been made of the effects of rising real energy prices on the projections of final energy demand, excluding uses in transport. The energy demands for these final consumers have been recalculated using the real energy price of 1980 throughout the projection period but maintaining all the other assumptions. The resulting energy demand levels from this calculation are all higher than those in the projections. The following table provides the percentage reductions in total useful energy below these calculated levels produced by the higher real energy prices in the projections.

TABLE 4
Final Energy Demand Excluding Transport Uses
Percentage Savings in Total Useful Energy From
Rising Real Energy Prices

Case	1990	2000	2010
X	13	24	29
YU	10	20	25
YL	10	21	25
Z	9	19	23
A	9	17	23
BU	6	15	20
BL	6	15	21
C	3	8	15

34. The figures in this table may be compared with the corresponding figure of 20% for the year 2000 used as an assumption in Energy Projections 1979 rather than derived by calculation. The figures for 2000 in Case X, YU YL and Z are very close to 20%.

35. A similar form of calculation, which estimates what energy demand would have been for these consuming sectors in 1980 had energy prices remained constant at their 1973 levels, yields a reduction of 5.9% in these energy demands as a result of rising real energy prices over the period 1973-1980. On an annual basis this represents an average saving of 0.82% pa which is lower than the rate of 0.92% pa for a 20% saving over the period 1980-2000. Since, in the domestic sector, many of the more cost-effective energy conservation measures such as tank lagging and roof insulation in owner-occupied houses have already been taken up, the projections represent a significant challenge for energy saving in the future. However, in the industrial sector, many potential energy saving opportunities are held up because of the present business uncertainty.

Primary Energy Demand

36. Table 5 provides projections of total UK primary demand for energy including non-energy uses. This measure of energy demand takes account both of final energy consumption and of energy use and losses in production and distribution within the energy industries.

37. As for total final energy demand the average projected growth rates of total primary energy demand over the projection period for each of the cases fall within the range of historical experience set out in Table 2.

38. Figure 1 provides a diagrammatic display of the projected range of primary energy demands together with a comparison with Energy Projections 1979. The spread of possible primary energy demand is very wide in the year 2010 reflecting fundamental uncertainty about the future path of the economy and of fuel prices. The range in 2000 is wider than that given in Energy Projections 1979, mainly because of the much wider spread of GDP growth rates assumed, as indicated in Figure 1. Allowing for differences in methodology, in the many assumptions underlying the two projection exercises and in the timing and level of the base point, the 2.5% pa GDP growth Case A lies between the 2% and 3% pa GDP growth cases for the year 2000 in Energy Projections 1979 and the higher energy price Case X lies just below the Energy Projection 1979 range.

39. The long-term nature of the energy projections implies not only the timescale of the projection period but also the absence of any attempt to project the effect of economic cycles on energy demands and supplies. For this reason the dotted lines in Figure 1 are meant only as a broad indication of the development of energy demand between snapshot years.

TABLE 5

UK PRIMARY ENERGY DEMAND PROJECTIONS

mtce

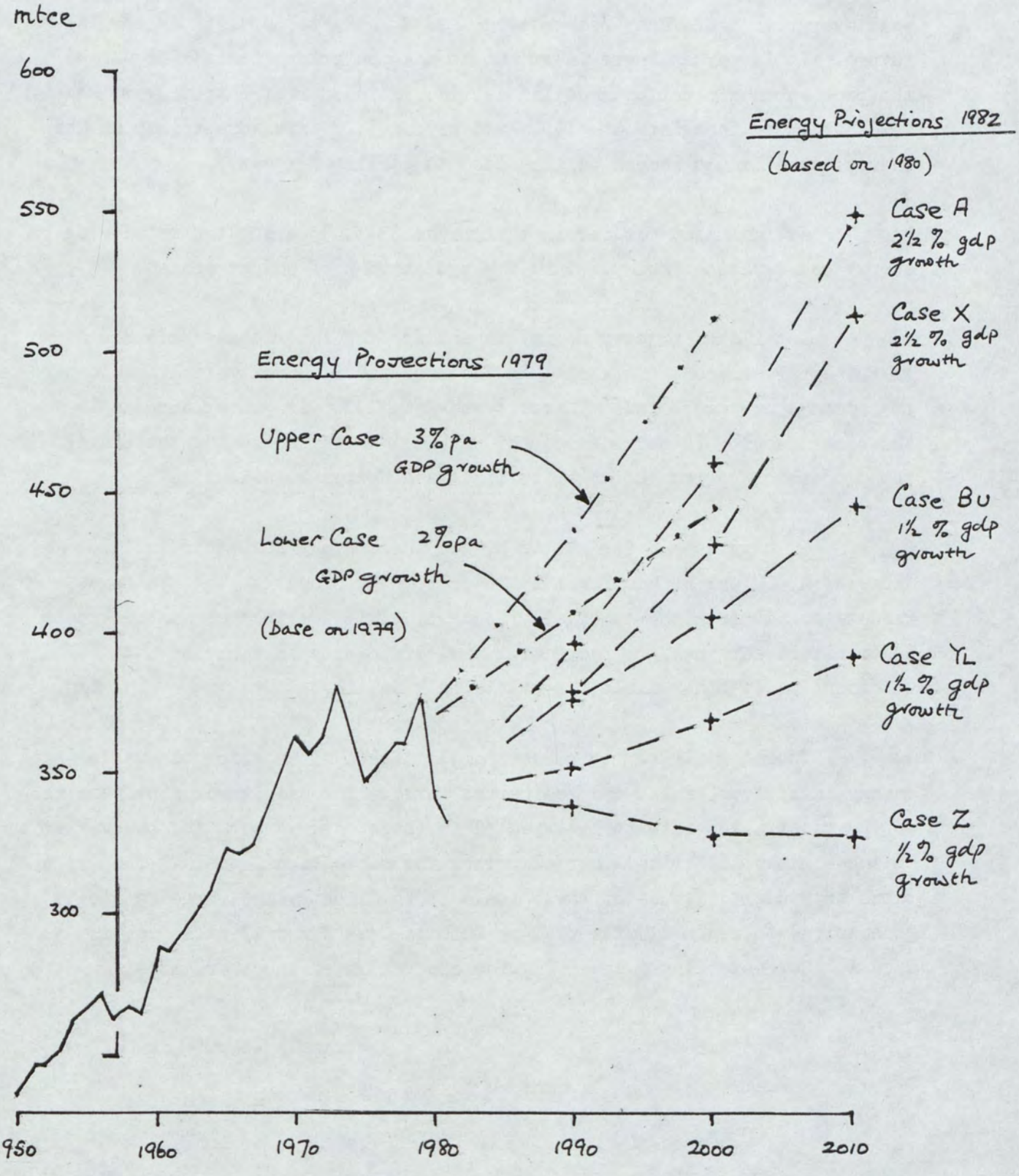
Higher World energy prices	GDP growth rate % pa	1980 actual	1990	2000	2010	Average annual growth 1980-2010 % pa
Case X	2.5		380	431	512	1.33
YU	1.5	345	360	388	420	0.66
YL	1.5		352	370	392	0.43
Z	0.5		339	328	327	- 0.17
Lower World energy prices						
Case A	2.5		396	461	549	1.57
BU	1.5	345	376	406	446	0.86
BL	1.5		368	387	415	0.62
C	0.5		355	350	353	0.08

Figure 1

COMPARISON WITH ENERGY PROJECTIONS 1979

TOTAL PRIMARY ENERGY DEMAND

including non-energy uses



40. In considering the decline in primary energy consumption over the 1970s displayed in Figure 1, it is tempting to ask whether energy demand will ever rise again and whether even Case Z looks too optimistic for the future. It is perhaps more important to ask the prior question of whether the poor economic performance and decline in industrial output over the 1970s will continue into the 1990s and beyond. If this were to happen then energy demand would indeed be projected to decline further.

41 As indicated earlier in paragraphs 33 to 35 a substantial degree of energy conservation is implied in the projections of energy demand.

42. Details of primary energy demand for the individual fuels are given in the upper sections of Panel 4 in Tables C and D. Substantial levels of coal demand are projected in Cases A and X in 2010 with lower amounts in the other cases. Primary demand for natural gas falls towards the end of the projection period as its price rises and UK reserves decline.

43. Primary demand for oil is higher in 2000 and 2010 than in 1980 in Cases A, X, BU and BL and lower in Cases YU, YL, C and Z. This pattern results mainly from the combined effects of variation in the rate of growth in transport services, increasing fuel efficiency in vehicles and substitution of other fuels for oil in bulk heating.

44. There are likely to be some small direct demands for renewable energy in biofuel, solar and geothermal forms. The main uncertainties arise in the penetration rate to be expected in these energy forms and the variation of these rates with rises in real prices for conventional fuels. The projections show a growing use of these fuels (both directly and for electricity generation) to reach 21 mtce p.a. in 2010 in Case X and 17 mtce p.a. in Case A. Correspondingly lower figures are projected in other cases.

45. The timing of the full-scale use of coal in the production of synthetic natural gas (SNG) is extremely uncertain. On the basis of the energy price projections in this study full scale production appears unlikely until the end of the projection period. However, the eventual decision will require a detailed economic analysis reflecting the range of options available at the time. Full-scale use of coal to produce liquid fuels or feedstocks has been assumed to be uneconomic over the projection period.

V. PROSPECTS FOR ELECTRICITY SUPPLY

46. This section discusses some possible implications for electricity supply which emerge from the demand projections discussed in the previous paragraphs. Once projections of overall levels of demand for electricity have been prepared a quite separate range of issues needs to be taken into account in considering how that demand might be met. In addition to the economic variables, there are non-economic factors which will influence the outcome. For electricity we cannot rely on international trade to build up and absorb future imbalances in domestic supply and demand. We need to consider carefully what supply options are open to us and what may be both economic and acceptable. The detailed analysis which follows, whilst recognising the very real uncertainties, attempts to illustrate how capacity might evolve. Clearly each investment option will be analysed at the time it arises in the circumstances then current. In considering these projections for electricity supply the reader should not be misled by the apparent mathematical precision of the figures; they can only have a broad indicative value. They represent neither programmes nor predictions.

47. Electricity demand grew rapidly during the 1960s at an average annual rate of 6.6% pa. This rate of growth slowed during the 1970s to 1.5% pa. Table 6 gives details of UK demand for electricity over the projection period for each of the cases. As can be seen from the lower part of the table the projected rates of growth are well below those experienced in the 1960s and are particularly low in Cases C and Z. In all the cases the projected rates of growth in electricity demand through the 1980s are lower than the overall rates of growth through to 2010 reflecting the similar paths assumed for growth in economic activity. The level of real energy prices and the price of electricity relative to other fuels will both affect the growth rates in electricity demand to some extent, together with the assumption for industrial structure.

48. The annual demand for electricity in energy units is linked to generating capacity through the shape of the system load curve, yielding the associated level of peak demand, and the planning margin. Assumptions have been made for both these factors. In England and Wales the system load curve has become less peaked. This tendency has been assumed to continue into the future. The system load factor, of some 57% in 1980, is assumed to rise to 61% in 2000 and to 62% in 2010. The CEGB's current planning margin of 28% has been used for this exercise. The Electricity Council are however currently carrying out a review of the industry's security standard in generation which is a major determinant of the planning margin. A lower margin would of course reduce the capacity required for a given projection of electricity demand.

49. The capacities of generating plant for the United Kingdom required to meet the estimated electricity demands in each projection case are shown in Table 7. As indicated in paragraph 46 above a number of factors must be taken into account in considering how much new capacity, and of what type, will be needed to provide the projected future levels of generating capacity. The capacity existing in 1980 and new plant under construction are clearly important. They are listed in Table 7. Existing plant is assumed to be retired at the end of its normal life, with the possibility of extending the life of coal stations for 10 years beyond the assumed normal life of 30 years at a cost of £120 per Kw.

50. The method used for projecting the combination of types of new generating plant, and the extent of life extension to existing coal plant, for the supply system in England and Wales, involves minimising the present value of the total capital and operating costs of the supply system over the projection period.

51. On the assumptions of capital and non-fuel operating costs for new plant listed in Table 12, overall supply system costs would be minimised by substantial commissioning of nuclear plant, both in substitution for existing higher cost plant and to meet demand. It is however, likely that the actual rate at which nuclear plant can be built and commissioned will be determined by a number of factors, including questions of priorities in national resource allocation. The projections of the quantity of nuclear build in Table 8 have in each case been constrained below the level which would be indicated by an approach based purely on the minimisation of total supply system costs. The choice of particular limits is necessarily a matter for judgement.

52. If such limits were seen to diminish in the early 1990s then substantial numbers of new nuclear stations are calculated to be economic for ordering then and commissioning in the decade 2001-2010. These levels of unconstrained new build for 2001-2010 are shown in Table 11. They are presented in this Table for illustration only and have not been included in the projection cases.

53. Tables 8, 9 and 10 list the projections of build for nuclear, coal-fired and peaking plant and for life extension of existing coal-fired plant, assuming that nuclear build will be subject to constraints through the whole of the period 1990-2010. In Table 8 the assumed upper limits for nuclear build in the 1990s are fully utilised in all cases apart from Case C in which some 5.2 GW of the assumed upper limit of 10 GW is taken up in the 1990s. In all cases substantial quantities of new nuclear plant are calculated to be economic in the 1990s at the costs listed

in Table 12. If, in the event, the nuclear builds of 20 GW listed in Cases X and A in Table 8 are not achievable in the 1990s, then additional coal fired plant would be required in its place together with some small increase in peaking plant. Table 10 indicates that in no projection case does the maximum possible life extension of existing coal fired stations prove economic in the 1980s. This is mainly because of the scale of plant already under construction in relation to the projections of electricity demand growth. The assumptions for construction of coal fired combined heat and power schemes are assumed to be taken up in the electricity supply calculations, see paragraph 59.

54. Ranges of estimates of nuclear fuel cycle costs have been prepared combining possible paths for future uranium prices and views on likely processing costs. The resulting profiles over the projection period are provided in Table A at the end of the paper.

55. Details of fuel use in power stations are provided in panel 3 of Tables C and D. In cases A and X coal demand increases to 2000 and then declines as nuclear displaces coal. In the remaining cases the use of coal declines over the projection period.

56. Once nuclear plant enters the margin of operation the projected rate of growth of electricity prices slows in real terms. In all cases this occurs after the year 2000. In the projections it has been assumed that nuclear plant will, by 2000, be able to load-follow, i.e. to adapt its level of electricity output to the daily fluctuations in demand.

57. The projections for electricity supply described in this section depend upon the many assumptions indicated in this Annex including the generating plant costs contained in Table 12 which are uncertain.

TABLE 6

UK ELECTRICITY DEMAND PROJECTIONS

Twh

	1980	1990	2000	2010
Case X	231.1	264.8	357.8	478.1
YU		249.1	301.6	357.6
YL		243.8	285.4	326.3
Z		229.0	239.9	252.4
Case A	231.1	274.0	372.3	494.0
BU		253.9	304.6	359.1
BL		247.9	284.9	323.8
C		235.1	241.7	241.1

Growth in GDP
% pa

	1980 -1990	1990 -2000	2000 -2010	1980 -2010
Case X	2.3	2.8	2.5	2.5
YU	1.2	1.9	1.5	1.5
YL	1.2	1.9	1.5	1.5
Z	0.3	0.8	0.5	0.5
Case A	2.3	2.8	2.5	2.5
BU	1.2	1.9	1.5	1.5
BL	1.2	1.9	1.5	1.5
C	0.3	0.8	0.5	0.5

Growth in Electricity Demand
% pa

	1980 -1990	1990 -2000	2000 -2010	1980 -2010
Case X	1.4	3.1	2.9	2.5
YU	0.8	1.9	1.7	1.5
YL	0.5	1.6	1.3	1.2
Z	-0.1	0.5	0.5	0.3
Case A	1.7	3.1	2.9	2.6
BU	0.9	1.8	1.7	1.5
BL	0.7	1.4	1.3	1.1
C	0.2	0.3	0	0.1

TABLE 7

UK PUBLIC ELECTRICITY SUPPLY

PROJECTIONS OF TOTAL GENERATING PLANT CAPACITY

AND NEW PLANT COMMISSIONING

	Total Capacity GW				Commissioning of new plant not yet ordered GW		
	1980	1990	2000	2010	1981 -1990	1991 -2000	2001 -2010
Case X	68.3	77.4	96.4	127.1	0.4	31.8	64.9
YU		74.0	83.2	95.2	0.2	18.9	46.1
YL		72.9	79.4	87.0	0.2	18.2	38.6
Z		72.2	69.0	67.1	0.2	11.8	25.1
Case A	68.3	79.5	100.0	130.8	1.3	34.5	65.0
BU		74.8	83.8	95.4	0.2	19.5	45.7
BL		73.4	79.3	86.1	0.2	14.9	41.0
C		72.2	69.3	64.1	0.2	7.4	26.5

New Capacity commissioned or under construction for commissioning during 1981-1990

	GW (Net)
Coal Fired	1.9
Oil Fired	5.3
Nuclear	5.6
Peaking Plant	1.4
Channel Link	1.8
TOTAL	16.0

TABLE 8

UK PUBLIC ELECTRICITY SUPPLY

ASSUMPTIONS FOR POSSIBLE COMMISSIONING OF NEW NUCLEAR PLANT AND NUCLEAR PLANT CAPACITY

	Nuclear plant Capacity GW				Commissioning of new nuclear plant not yet ordered. GW		
	1980	1990	2000	2010	1981 -1990	1991 -2000	2001 -2010
Case X	5.8	10.8	28.0	65.5	0	20.5	42.6
YU			22.6	48.5		15.0	31.0
YL			22.6	47.2		15.0	29.7
Z			17.6	31.7		10.0	19.2
Case A	5.8	10.8	28.5	65.9	0	20.9	42.5
BU			22.6	48.5		15.0	31.0
BL			17.6	34.6		10.0	22.1
C			12.7	26.4		5.2[1]	18.8

1 Calculated value.

TABLE 9

UK PUBLIC ELECTRICITY SUPPLY

PROJECTIONS FOR COMMISSIONING OF NEW NON-NUCLEAR CAPACITY

	Commissioning of new coal fired plant[1] not yet ordered. GW			Commissioning of new peaking plant not yet ordered GW		
	1981 -1990	1991 -2000	2001 -2010	1981 -1990	1991 -2000	2001 -2010
Case X	0.2	6.7	16.0	0.2	4.7	6.4
YU	0.2	0.5	11.3	0	3.4	3.8
YL	0.2	0.5	5.4	0	2.7	3.5
Z	0.2	0.5	2.3	0	1.3	3.6
Case A	0.2	8.4	17.0	1.1	5.1	5.5
BU	0.2	0.6	11.3	0	3.8	3.4
BL	0.2	1.1	15.3	0	3.8	3.6
C	0.2	0.5	4.6	0	1.7	3.1

1 Includes assumptions for the commissioning of new coal fired combined heat and power schemes of 0.2 GW in 1981-1990, 0.5 GW in 1991-2000 and 1.4 GW in 2001-2010.

TABLE 10

PROJECTIONS OF LIFE EXTENSION TO EXISTING COAL PLANT BEYOND A 30 YEAR LIFE

GW

	1981 -1990	1991 -2000	2001 -2010
Case X	4.3	15.3	14.6
YU	1.8	15.2	14.6
YL	0.6	12.1	14.6
Z	0	8.1	14.6
Case A	4.9	15.3	14.6
BU	2.6	15.3	14.6
BL	1.2	15.3	14.6
C	0	12.8	14.6
Maximum possible life extension	5.5	15.3[1]	14.6

In addition Case X includes withdrawal of 0.6 GW of oil fired capacity from reserve in 1981-1990 and Case A includes 1.3 GW from reserve in the same period.

1 Includes 1.1 GW conversion of oil fired capacity to coal firing.

TABLE 11

UK PUBLIC ELECTRICITY SUPPLY

Estimates of Nuclear Capacity and Build on Cost Grounds Alone after 2000

	Nuclear Plant Capacity GW		Commissioning of new nuclear plant not yet ordered GW	
	2000	2010	1991 -2000	2001 -2010
Case X	28.0	106.2	20.5	83.3
YU	22.6	75.0	15.0	57.5
YL	22.6	66.5	15.0	49.0
Z	17.6	44.8	10.0	32.3
Case A	28.5	89.1	20.9	65.7
BU	22.6	61.3	15.0	43.8
BL	17.6	52.9	10.0	40.4
C	12.7	31.5	5.2	23.9

NOTE: THESE FIGURES ARE PROVIDED FOR ILLUSTRATION ONLY: THEY ARE NOT INCLUDED IN THE ENERGY PROJECTIONS CASES.

TABLE 12

ASSUMPTIONS FOR CAPITAL AND NON-FUEL OPERATING COSTS AND PERFORMANCE OF NEW GENERATING PLANT.

1980 prices

	Coal	Oil	Gas turbine	Coal CHP	Nuclear
Capital Cost £/Kw					
Main plant	510	460	225	590	1000
Interest during Construction	140	120	25	100	265
Transmission	60	60	40	60	70
Initial fuel cost					60
Decommissioning Cost					30
R & D					25
Total Capital Cost	710[1]	640[1]	290	750[1]	1450[2]
Fixed operating costs £/Kw p.a.	9.63	9.63	6.09	9.63	12.14
Non-fuel variables Operating costs incl. fuel handling p/Kwh	0.125	0.125	0.355	0.125	0.185
Thermal efficiency % (in use)	36	30	25	31½*	(36)[3]
Average availability %	72	72	80	72	65

* The thermal efficiency quoted is that of electricity production alone. When the plant is producing heat the thermal efficiency is taken as 86%, 37% of this energy being taken in the form of electricity.

1 Increases at ½% p.a. between 1980-2000 and constant thereafter

2 Increases at 1% p.a. between 1980-2000 and constant thereafter

All plant assumed to take 8 years to build except gas turbine which is assumed to be built in 5 years.

3 Nominal figure only for expressing nuclear fuel costs in p/therm.

Other Contributions to electricity supply:

Combined Heat and Power
and Renewable Sources.

58. The principal source of heat for district heating schemes has been assumed to be coal fired electricity generating plant which can produce both heat and electric power. The assumed profile of heat production from this source is in line with the Marshall Report on Combined Heat and Power. A number of lead city schemes are currently under consideration by consultants on behalf of the Department and the projections include a possible scheme of 200 MW electricity generating capacity by 1990, building up to a possible 2 GW capacity by 2010 producing some 300 m. therms of district heat p.a. The electricity produced is taken into account in the balance of supply and demand for electricity in each projection.

59. A combination of geothermal and wind power is likely to contribute to the production of electricity in situations where investment in nuclear generating plant is not developed to levels based on expected cost grounds alone. As noted in paragraph 51 nuclear build in generating plant has been set, in all the projection cases, below the level indicated on cost grounds alone and in consequence renewable energy sources are projected to contribute to power station fuelling 8 mtce pa in 2010 in Case X and 7 mtcw pa in Case A. Lower figures are projected in other cases. Details are provided in Tables C and D at the end of the paper. Use of the Severn Barrage for electricity production has been excluded from the projections as further decisions have yet to be made. Its inclusion would involve a saving of some 5 mtce pa of fossil fuel and possibly nuclear fuel in power station fuelling; there would also be a saving of up to 1 GW in the requirement for generating capacity.

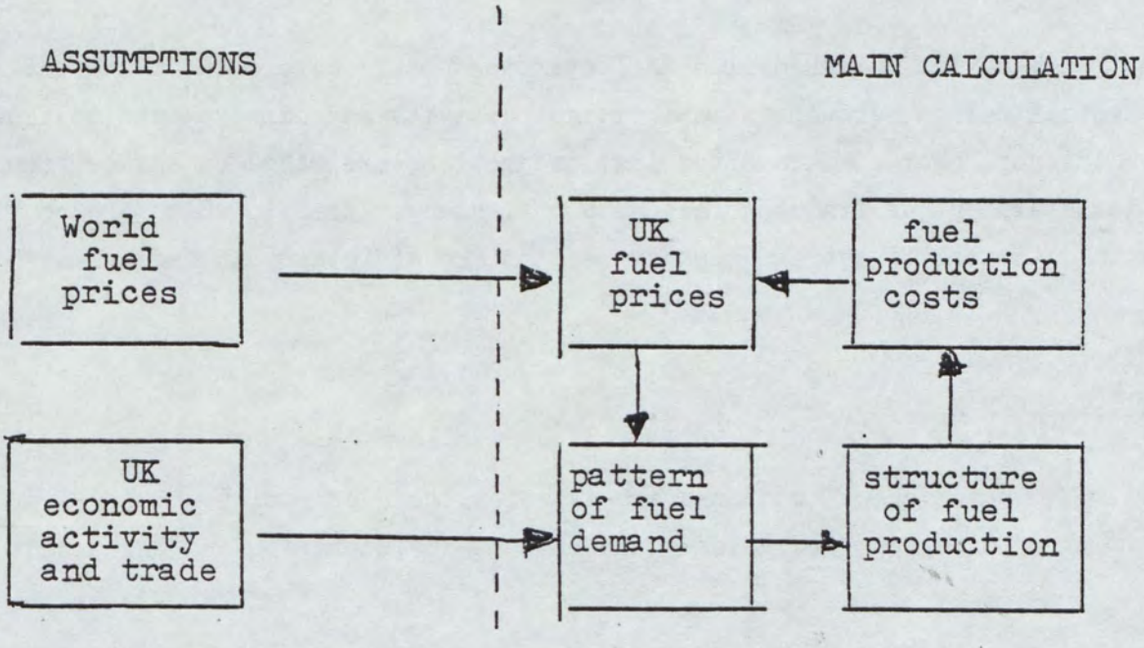
PROJECTION METHOD

1. This Appendix provides a description of the projection method employed as indicated in section II of the paper.

2. Figure 1 illustrates the main outline of the calculation. In a given year fuel demands in each sector of the economy are determined principally by UK fuel prices and levels of economic activity. These demands, together with the pattern of trade, provide the structure of fuel production which gives rise to costs of production for each fuel. UK fuel prices are influenced partly by production costs at home and partly by world fuel prices.

Figure 1

METHOD OF THE PREPARATION OF ENERGY PROJECTIONS



For tradable fuels, for example oil or coal, domestic prices are likely to be influenced strongly by world price levels. In such cases domestic production costs together with either taxes or grants affect the level of domestic production.

Energy Demand

3. The patterns of fuel demand in the main energy consuming sectors have been analysed over the period 1954-1979 and relationships established which relate the demands by each sector for each main fuel to levels of economic activity for the sector and both current and past fuel prices. Variations in annual temperature have been allowed for in this work.

4. Energy demands in transport are treated separately for road, rail, air and ships' bunkers. Demand for road transport is based on the Department of Transport models used to prepare National Road Traffic Forecasts. These forecasts are based on assumptions for GDP growth and fuel prices and provide estimates of vehicle kilometres per annum separately for cars, public service vehicles, light vans and heavy freight vehicles. Assumptions made on saturation levels for vehicle ownership, fuel efficiency and on fuel mix provide estimates of fuel use in road transport.

5. Advice is taken from the Department of Transport on future rail electrification, growth in rail freight activity and improvements in fuel efficiency. For air transport fuel projections are based on advice from the Department of Trade on forecasts of passenger traffic which are combined with estimates of average journey lengths and efficiency in fuel use.

Energy Supply

6. Detailed calculations are made for the electricity supply industry in England and Wales which chooses the operation and investment

plans for different generating plant types in order to minimise the present value of the future capital and operating costs of the generating system required to meet the estimated electricity demands arising from the demand calculation. The costs of producing electricity from marginal operating plant are used to prepare electricity prices for each consuming sector.

7. The prices of coal and petroleum products in the UK are related in the projections to assumed future paths for coal and crude oil prices in international trade. In the longer term the price of gas landed in Britain is assumed to move broadly in line with assumed future gas prices in European markets and that these will be related to prices of competing oil products.

8. Alternative projections of energy demand and of the supply patterns for electricity (for which international trade is insufficient to balance supply and demand) are prepared on the basis of these prices and the economic assumptions.

9. Individual investment possibilities for coal, oil and gas industries in the UK are assessed, as they arise, inter alia on the basis of the energy projections and circumstances available at the time the assessments are made.

10. For new forms of energy supply, such as biofuels, geothermal, solar, wind etc. estimates are made (i) of the date at which the new energy forms first become economic, (ii) of the potential level of competitive supply at the assumed future prices of other fuels and (iii) the likely rate of penetration of the new energy form. Judgement is required in assessing each of these factors. Estimates are also made of the likely customers of these energy forms and of the conventional fuels displaced. The contributions of the new fuels are not necessarily additive, especially for those used in electricity generation, as the adoption of one form such as tidal reduces the potential of other renewables eg wind power.

The Calculation

11. The calculation outlined in Figure 1 is made for each of a number of snapshot years in the future. These calculations are linked through time both by the lagged effect of prices on fuel demands and by the cost minimisation calculation for electricity supply.

12. The results of this form of calculation provide details of fuel consumption by each consuming sector and the pattern of electricity production. Alternative projections are prepared by varying the many assumptions underlying the calculations.

13. The form of this calculation is necessarily a highly simplified description of reality and contributes to the uncertainty attaching to the projections.

PROSPECTS FOR ENERGY DEMAND

SECTORAL ANALYSIS

1. Projections for energy demand by final consuming sectors are given in Tables E and F and are described below for each of the principal final consuming sectors; domestic, iron and steel, other industry, transport and other consumers. The last category consists of agriculture, public and private services. A further section provides details on non-energy uses of fuels.

2. The methodology used in all sectors, except transport and non-energy uses, is to project total useful energy demand (i.e. energy demand adjusted for efficiency in end use) for each sector, related to assumptions for future economic activity and real energy prices. Total useful energy demand is then allocated between fuels on the basis of their future real price movements, and, additionally in the case of electricity, of economic growth. In addition, technological information is used to derive the fuel allocation in the iron and steel sector. The projected useful energy demands in total and for individual fuels are then adjusted, using efficiency factors, to derive the heat supplied figures given in Tables E and F. Adjustments are also made to fuel allocation to allow for the impact of CHP, renewables and biofuels.

3. In the transport sector the economic basis for the energy demand estimates is supplemented by technological information provided by the Department of Transport.

Domestic Sector

4. No increase is projected for total delivered energy between 1980 and 1990 in case X. In cases Y and Z demand is expected to fall slightly, although in the lower fossil fuel price cases, small increases are projected in cases A, BU and BL. Between 1990 and 2010 an increase of 29% is projected in case A. At the lower end of the range in case Z, the projection is for a decline of 7%. Although these figures illustrate the importance of real income as a determinant of domestic energy demand, the effect on increased comfort levels and hence energy demand is offset by increases in real fuel prices stimulating the take-up of energy conservation measures within the space and water heating sector.

5. Despite large real increases in price, gas is expected to increase its market share in all projections in the decade to 1990 as consumers continue to move to gas from other fuels for space and water heating purposes. Between 1990 and 2010 as gas becomes relatively more expensive, this share is likely to decline, except in case C, as consumers tend to move to electricity for space heating purposes. Nevertheless by 2010 the share of gas in this sector in no case is below 57% compared with a 1980 figure of 53%. Solid fuel demand, declines to 1990 but its demand remains stable thereafter. Although fossil fuel demands in 2010 are generally higher in the lower price cases, an exception is solid fuel in Case C where the high coal price ratio to gas price prevents any substitution towards solid fuel.

6. The range of growth of electricity demand to 2010 is large and although some substitution of electricity for gas is projected after 2000, the figures reflect a large range of increases in demand for electricity specific uses which are dependent on real income growth. Electricity demand is less influenced by fuel price changes than fossil fuels and there is little difference between "higher price" and "lower price" cases.

7. Although renewables (solar and geothermal), biofuels and CHP do not make a significant impact until the next century, by 2010 they are estimated to account in total, for some 4-6% of this sector's use of energy, thereby displacing some gas and solid fuel.

Iron and Steel

8. Total energy demand is determined partly by the production level of this sector. In the most optimistic growth case A energy demand in 2010 is 30% above its 1981 level. In cases YL and Z the assumed decline in ferrous metal production is reflected in falls of 39% and 43% respectively in energy demands from 1981 to 2010. There are no significant differences between higher and lower fossil fuel price cases.

9. Solid fuel is expected to increase its share in all cases displacing oil and gas; market shares of 80-84% in 2010 are projected compared with a 1980 figure of 50%. In no case is solid fuel expected to regain its consumption levels of 1970 however. Gas and Oil demands decline in all cases and by 2010 their combined usage is very small. There are only small differences between higher and lower fossil price cases.

10. There is no significant difference in electricity consumption between higher and lower fossil fuel price cases. Demand is expected to increase in those cases where ferrous metal production increases and conversely decline when there is a decrease. In no case is electricity demand expected to exceed 0.5 bn therms or 12% of sectoral energy demand.

Other Industry

11. Between 1980 and 1990 industrial energy demands are expected to increase slightly, except in case Z where the very low growth rate assumed for manufacturing production is not sufficient to outweigh the influence of increased fuel prices which stimulate energy saving. Between 1990 and 2010, in all cases except C and Z where declines are projected, the growth rate in energy demand is higher due to an increased rate of growth of manufacturing output and to less rapid increases in real fuel prices. Although in Case Z energy demand in 2010 is still below its 1980 level, in case A it is almost 50% above.

12. An important feature is that solid fuel is expected to increase its market share in all cases by displacing oil and gas; in case Z it achieves its highest penetration of 45% in 2010 because of a very low ratio of the coal to fuel oil price. In the lower price cases A, BU, BL and C demands for gas and oil are higher than the corresponding 'higher price' cases. However for solid fuels, only in case A do lower solid fuel prices lead to higher demands than in case X. In case X, the highest fossil fuel price case, coal prices are assumed to accelerate faster than oil prices in the face of excess world demand leading to a rise in the coal/fuel oil price ratio. This effect produces the relatively low solid fuel consumption figure for case X. Given the high rate of economic and industrial growth assumed in this case, this solid fuel consumption figure may be too pessimistic. Further development of projection techniques for energy demand for this sector may throw further light on the interaction between growth in industrial output,movements in fuel prices and the rate of fuel substitution.

13. The very large range of increases in electricity demands is attributable to the large range of manufacturing growth assumptions between low and high growth cases. Though much of electricity use is specific to that fuel, such as motive power, the relatively low rate of growth of real electricity price implies some substitution to electricity from other fuels.

14. CHP demand is likely to be small for this sector and no renewables are included. However, the potential for the use of biofuels to displace solid fuel and gas is large, particularly in the higher fossil fuel price cases; penetration into delivered energy in case X is as high as 9%.

Other Consumers

15. Agriculture is a small consumer of energy within this sector. The main use of energy in this sector as a whole is in the form of space and water heating and lighting for employees and customers. Energy demand is projected by relating it to indicators of employment, economic growth and real energy prices. In the higher fossil fuel cases X, YU, YL and Z energy demand is projected to increase by 19% in case X between 1980 and 2010 and decline by 15% in case Z. Although substantial increases in activity and employment are assumed, the effect of real price increases in stimulating energy conservation could be large. In the lower fossil fuel price cases A, BU, BL and C conservation is more modest and energy demands are expected to increase by as much as 33% in case A.

16. Gas is expected to increase its share and quantity between 1980 and 2000 in all cases and thereafter remain stable. By 2010 its projected market share ranges between 25% in case X and 35% in case C. Oil demands decline over this period to well below current levels. No increase in the market share of solid fuel is expected except in case Z.

17. In common with other sectors, the range of growth of electricity demand to 2010 is large, reflecting primarily the wide range of assumptions on growth of economic activity and employment within this sector. Nevertheless, because electricity increases less rapidly in price than other fuels, some substitution into electricity for space and water heating purposes may occur.

18. Although CHP is only expected to contribute 0.1bn therms to total demand, biofuels and renewables in total could account for as much as 7% of delivered energy in this sector by 2010. However, in the case of lower fossil fuel prices, this penetration is expected to be lower.

Transport

19. Energy demand in the transport sector is derived from separate analyses of the requirements for road, rail, air and water transport. For cases A, B, X and Y the sector shows steady growth in energy demand over the period to 2010. However in both cases C and Z, demand reaches a plateau of around 15 billion therms in 1990 and there is little projected change in demand through the period to 2010.

20. The principal component of fuel use in road transport is motor spirit consumption by cars. Motor spirit price assumptions are presented in Table A. The underlying tax assumptions are that the present two-tier tax structure will remain in force with VAT continuing at 15 percent, and motor spirit duty will remain constant in real terms (as opposed to remaining a constant proportion of the untaxed price). Projections are obtained by combining car traffic forecasts using the Department of Transport model together with assumptions about the future development of fuel efficiency in cars. The latter has been assumed to improve from its present level of about 30 mpg to 40 mpg in 2000 and 45 mpg in 2010. Whilst the present use of derv in cars is negligible, by 2000 its use is assumed to increase to 8% and by 2010 to 11%. It has been assumed that electrically driven vehicles will not make a significant contribution to energy demand over the projection period.

21. Projections of fuel use for air transport are based on projections of terminal passengers at UK airports prepared by the Department of Trade in conjunction with a saturation level for the more distant future of 180 million terminal passengers pa. Demand for aviation fuel is derived from estimates of terminal passengers, average distance travelled and plane size.

22. Rail transport is split between passenger and freight traffic. Projections of passenger traffic are based on the projection included in the Review of Main Line Electrification prepared jointly by the British Rail Board and the Department of Transport. The proportions of traffic hauled by electricity and diesel fuels are consistent with central options in the Review. 75% of passenger traffic and 54% of freight traffic is assumed to be electrically hauled by 2005 with no increase thereafter. The rest is assumed to be hauled by diesel locomotives. The fuel efficiency of diesel and electric trains has been static in recent years. No improvement in diesel or electricity used per kilometre is incorporated in these projections.

Non-Energy Uses and Bunkers

23. The largest non-energy use for oil and gas is as a feedstock for petrochemical plants. The world demand for chemicals is expected to grow rapidly over the next twenty years. Although continuing improvements in efficiency are likely, the use of feedstocks is also expected to show a rapid growth. The chemical industry operates in a highly competitive international market, expansion in world activity may be concentrated where there is access to cheap feedstocks (e.g. in the Middle East), so there is considerable uncertainty about the future for the UK industry. The projections show a strong growth in oil feedstocks - naphtha and natural gas liquids - but a decline in gas.

24. The other non-energy uses (lubricating oil, bitumen, etc) are projected to show little change from the 1980 level.

25. Much of the oil used as bunker fuel is for tankers carrying imported crude oil, so this use is expected to grow after the peak in North Sea production is passed.

ENERGY PROJECTIONS

1982

TABLES A-F

Figures are quoted in these tables with sufficient significant figures to display consistency within each projection case. The reader should not be misled by the apparent mathematical precision of the figures: they are subject to considerable uncertainty.

UK ENERGY PRICE PROJECTIONS

TABLE A

Lower Fossil Fuel Price Assumptions

Price indices 1980 = 100 (unless otherwise indicated)
Price level - p/therm unless otherwise indicated.

	1980 level	1982 Q3 estimates index	1990 A	1990 BU	1990 BL	1990 C	2000 A	2000 BU	2000 BL	2000 C	2010 A	2010 BU	2010 BL	2010 C
DOMESTIC														
Gas	22.5	129 [8]	169	165	165	149	236	211	211	155	322	275	275	195
Oil	39.0	116	123	99	99	82	177	158	158	114	237	203	203	144
Coal	23.5	99	123	111	111	99	164	150	150	124	209	176	176	145
Electricity (average)[1 7]	4.41 p/Kwh	104	111	100	100	92	131	127	129	109	153	140	143	140
electricity (marginal)[1 2]	2.60 p/Kwh	106	118	99	99	86	146	139	143	109	178	156	161	155
INDUSTRY														
Gas 3	17.6	108 [8]	148	118	118	95	215	190	190	132	343	289	289	194
Fuel Oil	22.5	104	129	100	100	80	191	169	169	116	262	220	220	149
Gas Oil	35.0	105	121	99	99	80	180	160	160	117	240	206	206	146
Coal 3	13.4	104	122	107	107	93	175	160	160	130	227	190	190	160
Coal 4	14.6													
Electricity 1	2.37 p/Kwh	98	130	109	109	94	160	153	156	119	196	171	176	170
POWER STATIONS														
Coal 5	14.3	100	121	107	107	93	170	156	156	128	219	184	184	156
Fuel Oil	22.0	105	130	100	100	80	193	170	170	116	266	223	223	150
Nuclear Fuel Cycle Cost	4.0	NA	159	131	131	105	211	159	159	119	264	185	185	131
PRIVATE SERVICES														
Gas	24.3	102 [8]	140	136	136	121	202	179	179	127	282	238	238	164
Oil	36.0	104	121	99	99	81	178	158	158	117	236	203	203	144
Solid Fuel	36.6	90	122	113	113	102	159	144	144	121	199	169	169	138
Electricity 1	3.64 p/Kwh	105	117	104	104	94	140	135	137	113	165	150	153	149
PUBLIC SERVICES														
Gas	24.3	102 [8]	140	136	136	121	202	179	179	127	282	238	238	164
Oil	36.0	104	121	99	99	81	178	158	158	117	236	203	203	144
Coal	16.3	104	118	106	106	94	161	149	149	125	204	174	174	149
Electricity 1	3.39 p/Kwh	105	118	104	104	93	141	136	139	113	168	151	155	151
RAILWAYS														
Diesel Oil	35.0	105	121	99	99	80	180	160	160	117	240	206	206	146
Electricity 1	2.68 p/Kwh	106	121	102	102	89	148	141	145	112	180	158	163	157
ROAD TRANSPORT														
Motor Spirit	129 p/gall	110	122	111	111	102	150	142	142	121	180	164	164	136
														$/bl
INTERNATIONAL CRUDE OIL PRICE [6]	30.8 $/bl	34	36	27	27	20	52	43	43	27	74	55	55	33

1. Calculated for each projection.. All other prices are assumptions.
2. For domestic customers between 750 and 7500 Kwh consumptions p.a.
3. Average price for large industrial consumer.
4. Typical price for an industrial consumer.
5. Estimate of price for new contracts.
6. (1980) $ per bbl in all years, expressed in terms of an international basket of currencies denominated in US $.
7. For domestic customers between 0 and 2500 Kwh consumption p.a.
8. Late 1982 estimates.

NA Not Available.

UK ENERGY PRICE PROJECTIONS

TABLE A (Continued)

Higher Fossil Fuel Price Assumptions

Price indices 1980 = 100 (unless otherwise indicated)
Price level - p/therm unless otherwise indicated.

	1980 level	1982 Q3 estimates index	1990 X	1990 YU	1990 YL	1990 Z	2000 X	2000 YU	2000 YL	2000 Z	2010 X	2010 YU	2010 YL	2010 Z
DOMESTIC		8												
Gas	22.5	129	194	185	185	180	357	293	293	269	440	363	363	338
Oil	39.0	116	155	141	141	118	264	214	214	196	318	260	260	242
Coal	23.5	99	151	131	131	120	235	186	186	158	281	217	217	185
Electricity (average)[1 7]	4.41 p/Kwh	104	130	110	111	103	162	138	138	126	184	155	154	146
electricity (marginal)[1 2]	2.60 p/Kwh	106	149	115	118	104	198	157	157	137	230	181	180	166
INDUSTRY		8												
Gas 3	17.6	108	192	174	174	146	340	274	274	250	479	390	390	361
Fuel Oil	22.5	104	176	160	160	131	309	249	249	227	376	304	304	280
Gas Oil	35.0	105	154	140	140	119	266	217	217	199	320	263	263	246
Coal 3	13.4	104	167	137	137	122	287	212	212	175	331	242	242	204
Coal 4	14.6													
Electricity 1	2.37 p/Kwh	98	163	127	129	114	218	175	173	151	252	198	197	183
POWER STATIONS														
Coal 5	14.3	100	163	135	135	121	275	205	205	170	317	233	233	198
Fuel Oil	22.0	105	177	161	161	132	314	252	252	230	382	309	309	284
Nuclear Fuel Cycle Cost	4.0	NA	159	131	131	105	211	159	159	119	264	185	185	131
PRIVATE SERVICES														
Gas	24.3	102[8]	162	154	154	149	314	255	255	233	391	319	319	296
Oil	36.0	104	153	139	139	118	261	214	214	196	314	258	258	242
Solid Fuel	36.6	90	143	128	128	119	210	172	172	150	256	204	204	175
Electricity 1	3.64 p/Kwh	105	139	115	117	107	177	148	148	134	202	167	166	157
PUBLIC SERVICES														
Gas	24.3	102	162	154	154	149	314	255	255	233	391	319	319	296
Oil	36.0	104	153	139	139	118	261	214	214	196	314	258	258	242
Coal	16.3	104	155	131	131	118	253	192	192	161	290	217	217	186
Electricity 1	3.39 p/Kwh	105	142	116	118	107	182	150	150	135	208	170	169	159
RAILWAYS														
Diesel Oil	35.0	105	154	140	140	119	266	217	217	199	320	263	263	246
Electricity 1	2.68 p/Kwh	106	150	118	120	107	199	159	159	140	230	182	181	168
ROAD TRANSPORT														
Motor Spirit	129 p/gall	110	138	132	132	121	192	169	169	160	219	191	191	184
														$/bl
INTERNATIONAL CRUDE OIL PRICE[6]	30.8 $/bl	34	51	44	44	34	88	65	65	55	107	79	79	67

1. Calculated for each projection. All other prices are assumptions.
2. For domestic customers between 750 and 7500 Kwh consumptions p.a.
3. Average price for large industrial consumer.
4. Typical price for an industrial consumer.
5. Estimate of price for new contracts.
6. (1980) $ per bbl in all years, expressed in terms of an international basket of currencies denominated in US $.
7. For domestic customers between 0 and 2500 Kwh consumption p.a.
8. Late 1982 estimates.

NA Not Available.

UK ENERGY PROJECTIONS

TABLE B

ECONOMIC ASSUMPTIONS

indices 1975 = 100 unless otherwise indicated.

	1980	1990 X A	1990 YU BU	1990 YL BL	1990 Z C	2000 X A	2000 YU BU	2000 YL BL	2000 Z C	2010 X A	2010 YU BU	2010 YL BL	2010 Z C
GDP (output at factor cost)index	107.2	134	121	121	111	176	146	146	120	225	170	170	129
Real personal disposable income index	114.9	134	125	125	118	176	151	151	127	226	175	175	137
Cases													
Real exchange rate (X YU YL Z)	2.33	2.10	2.02	2.02	1.94	2.00	1.87	1.87	1.75	2.00	1.84	1.84	1.69
$/£(1980 prices) (A BU BL C)	2.33	1.98	1.90	1.90	1.85	1.87	1.75	1.75	1.63	1.90	1.69	1.69	1.53
UK population (million)	56.0	57.0	57.0	57.0	57.0	58.3	58.3	58.3	58.3	58.8	58.8	58.8	58.8
Persons per household (Nos.)	2.58	2.52	2.52	2.52	2.52	2.52	2.52	2.52	2.52	2.52	2.52	2.52	2.52
Agriculture, forestry and fishing output index	120.5	157	140	133	124	218	175	155	132	293	209	174	140
Industrial output indices													
Iron and Steel mlh 311-313	67.1	88	82	68	65	106	94	62	56	126	104	56	50
Chemical and Allied mlh 271-279	109.7	182	146	129	115	336	222	164	127	587	312	199	140
Building materials mlh 461-469	90.6	118	105	100	93	164	131	116	99	220	157	131	105
Other manufacturing mlh 211-240, 321-450, 471-499	95.6	122	109	106	99	161	132	122	106	204	154	138	112
Total manufacturing	95.1	124	110	105	98	172	138	122	104	231	165	137	110
Service sector indices													
Distributive trades output index	106.1	141	122	120	110	198	154	145	119	271	185	168	128
Miscellaneous services output index	116.4	133	125	132	121	158	140	159	130	184	153	184	140
Private, financial, professional and scientific services employment index	111.5	136	129	126	116	174	162	150	126	217	193	173	137
Public services employment index	101.2	113	108	112	106	129	118	130	113	146	127	146	122

UK ENERGY PROJECTIONS
Higher Fossil Fuel Price Assumptions

TABLE C

bn therms

UK FINAL ENERGY DEMAND BY SECTOR

	1960	1970	1980	1990				2000				2010			
				X	YU	YL	Z	X	YU	YL	Z	X	YU	YL	Z
Domestic	14.4	14.6	15.8	16.0	15.4	15.4	14.8	17.0	15.7	15.7	13.9	19.6	16.8	16.7	13.8
Iron and Steel	7.1	7.2	2.9	3.6	3.4	2.9	2.8	3.8	3.5	2.4	2.2	4.1	3.5	2.0	1.9
Other Industry	14.3	17.3	14.6	15.8	15.3	14.8	14.5	17.4	16.3	15.1	14.2	19.9	17.5	15.7	14.4
Transport	8.8	11.2	14.1	16.4	15.4	15.4	14.8	17.9	16.6	16.6	14.8	19.0	17.3	17.3	15.1
Other Consumers	5.9	7.4	7.5	7.3	7.1	7.1	6.9	7.8	7.2	7.2	6.5	8.9	7.7	7.6	6.4
TOTAL	50.5	57.7	54.8	59.2	56.7	55.7	53.9	63.8	59.3	57.0	51.5	71.4	62.8	59.4	51.4

UK FINAL ENERGY DEMAND BY FUEL

bn therms

	1960	1970	1980	1990				2000				2010			
				X	YU	YL	Z	X	YU	YL	Z	X	YU	YL	Z
Solid Fuel	32.1	18.5	7.5	8.1	8.8	8.3	7.7	8.6	10.1	8.9	8.9	9.5	11.1	9.3	10.3
Gas	2.6	5.5	14.8	17.3	16.2	16.0	15.6	16.0	14.6	14.4	12.8	15.8	13.6	13.4	11.0
Electricity	3.4	6.6	7.7	8.8.	8.3	8.1	7.6	12.0	10.1	9.5	8.0	16.1	12.0	10.9	8.4
Oil	12.4	27.2	24.8	24.7	23.3	23.0	22.9	25.7	23.3	23.0	21.0	26.3	23.2	22.8	19.5
CHP				0	0	0	0	0.1	0.1	0.1	0.1	0.4	0.4	0.4	0.4
Biofuels				0.3	0.2	0.2	0.1	1.1	0.8	0.8	0.5	2.7	2.1	2.1	1.4
Renewables				0	0	0	0	0.3	0.3	0.3	0.1	0.6	0.5	0.5	0.3
TOTAL	50.5	57.7	54.8	59.2	56.7	55.7	53.9	63.8	59.3	57.0	51.5	71.4	62.8	59.4	51.4

UK POWER STATION FUELLING

mtce

	1960	1970	1980	1990				2000				2010			
				X	YU	YL	Z	X	YU	YL	Z	X	YU	YL	Z
Coal	53.5	77.3	89.7	90.8	82.3	79.3	72.7	92.6	81.6	74.6	63.5	62.0	48.7	38.2	37.7
Oil	9.3	21.4	11.2	6.3	5.7	5.5	5.0	10.8	7.3	5.9	4.7	3.2	2.0	1.7	1.9
Nuclear and Hydro 1	2.6	11.8	15.3	35.1	35.1	35.1	35.1	71.9	60.1	60.1	49.1	153.6	117.1	114.2	81.2
Renewables 2		0.2	0.6	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	7.9	2.4	1.9	0.3
TOTAL	65.5	110.7	116.8	132.6	123.4	120.2	113.1	175.6	149.4	141.0	117.6	226.8	170.2	156.0	121.2

UK PRIMARY DEMAND

mtce

PRIMARY DEMAND	1960	1970	1980	1990				2000				2010			
				X	YU	YL	Z	X	YU	YL	Z	X	YU	YL	Z
ENERGY USES															
Coal	198.6	156.9	120.8	125.2	119.3	114.2	105.0	128.3	123.3	111.2	99.9	138.9	104.9	83.7	80.0
Natural Gas	0.1	17.1	64.2	74.8	70.4	69.8	67.8	69.6	63.6	62.8	56.3	43.2	52.2	53.6	48.7
Oil	68.1	150.0	121.4	117.2	109.9	108.6	107.3	128.7	113.3	109.9	99.9	124.3	108.0	105.7	91.3
Nuclear and Hydro 1	2.6	11.9	15.4	35.1	35.1	35.1	35.1	71.9	60.1	60.1	49.1	153.6	117.1	114.2	81.2
Biofuels				1.2	0.7	0.7	0.5	4.5	3.3	3.3	2.1	10.9	8.5	8.5	5.6
Renewables				0.1	0.1	0.1	0.1	1.1	1.0	1.0	0.6	9.9	3.9	3.4	1.4
TOTAL ENERGY USES	269.4	335.9	321.8	353.6	335.5	328.5	315.7	404.1	364.6	348.3	307.9	480.6	394.7	369.1	308.2
NON ENERGY USES															
Natural Gas		0.8	6.9	6.4	6.4	6.4	6.4	2.0	2.0	2.0	2.0	0.0	0.0	0.0	0.0
Oil (feedstock)	7.0	17.0	11.8	16.5	15.1	14.8	14.3	20.9	17.8	16.7	14.6	27.9	21.6	19.4	15.8
Oil (Bunkers)	9.4	9.4	4.2	3.1	2.7	2.7	2.9	3.7	3.6	3.4	3.2	3.9	3.7	3.7	3.2
TOTAL NON ENERGY USES	16.4	27.2	22.9	25.9	24.2	23.9	23.6	26.6	23.4	22.1	19.8	31.8	25.3	23.1	19.0
TOTAL PRIMARY DEMAND	285.8	363.1	344.7	379.5	359.7	352.4	339.3	430.8	388.0	370.3	327.7	512.4	420.0	392.2	327.2

1. Includes Channel Link and Pumped Storage.
2. Includes a small amount of gas.

UK ENERGY PROJECTIONS

Lower Fossil Fuel Price Assumptions

TABLE D

UK FINAL ENERGY DEMAND BY SECTOR

bn therms

	1960	1970	1980	1990				2000				2010			
				A	BU	BL	C	A	BU	BL	C	A	BU	BL	C
Domestic	14.4	14.6	15.8	16.8	16.1	16.1	15.8	19.2	17.3	17.2	16.2	21.7	18.3	18.3	16.2
Iron and Steel	7.1	7.2	2.9	3.7	3.6	3.0	2.9	4.0	3.6	2.4	2.3	4.2	3.6	2.0	1.9
Other Industry	14.3	17.3	14.6	16.7	16.2	15.7	15.5	19.1	16.9	15.7	15.2	21.6	18.1	16.2	14.8
Transport	8.8	11.2	14.1	16.6	15.8	15.8	15.0	18.4	16.9	16.9	15.1	19.4	17.6	17.6	15.3
Other Consumers	5.9	7.4	7.5	7.8	7.7	7.7	7.5	8.8	7.8	7.8	7.4	10.0	8.3	8.2	7.1
TOTAL	50.5	57.7	54.8	61.7	59.3	58.3	56.7	69.5	62.5	60.1	56.1	76.8	65.9	62.3	55.3

UK FINAL ENERGY DEMAND BY FUEL

bn therms

	1960	1970	1980	1990				2000				2010			
				A	BU	BL	C	A	BU	BL	C	A	BU	BL	C
Solid Fuel	32.1	18.5	7.5	8.4	7.8	7.4	7.1	10.1	8.5	7.4	5.8	11.8	10.1	8.4	5.4
Gas	2.6	5.5	14.8	17.8	16.6	16.5	16.3	18.4	16.6	16.4	16.5	18.2	16.1	15.9	16.0
Electricity	3.4	6.6	7.7	9.1	8.4	8.2	7.8	12.5	10.2	9.5	8.0	16.6	12.0	10.8	8.0
Oil	12.4	27.2	24.8	26.1	26.2	26.0	25.3	27.4	26.3	25.8	25.1	27.2	25.4	24.9	24.1
CHP				0	0	0	0	0.1	0.1	0.1	0.1	0.4	0.4	0.4	0.4
Biofuels				0.3	0.2	0.2	0.1	0.8	0.6	0.6	0.4	1.9	1.4	1.4	1.1
Renewables				0	0	0	0	0.3	0.2	0.2	0.2	0.6	0.5	0.5	0.3
TOTAL	50.5	57.7	54.8	61.7	59.3	58.3	56.7	69.5	62.5	60.1	56.1	76.8	65.9	62.3	55.3

UK POWER STATION FUELLING

mtce

	1960	1970	1980	1990				2000				2010			
				A	BU	BL	C	A	BU	BL	C	A	BU	BL	C
Coal	53.5	77.3	89.7	95.4	85.0	81.7	75.6	97.8	82.8	85.8	75.9	68.0	49.5	64.9	44.1
Oil	9.3	21.4	11.2	7.2	5.9	5.9	5.3	10.7	7.6	6.1	4.9	3.4	2.0	2.3	2.3
Nuclear and Hydro [1]	2.6	11.8	15.3	35.1	35.1	35.1	35.1	73.0	60.1	49.1	38.1	154.8	117.2	86.6	69.2
Renewables [2]		0.2	0.6	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	7.2	1.9	0.3	0.3
TOTAL	65.5	110.7	116.8	137.9	126.3	123.0	116.2	182.0	150.9	141.4	119.3	233.4	170.6	154.1	115.9

UK PRIMARY DEMAND

mtce

PRIMARY DEMAND	1960	1970	1980	1990				2000				2010			
				A	BU	BL	C	A	BU	BL	C	A	BU	BL	C
ENERGY USES															
Coal	198.6	156.9	120.8	130.9	118.0	112.7	105.8	139.7	118.0	116.2	100.0	176.0	129.0	135.1	102.3
Natural Gas	0.1	17.1	64.2	77.0	72.1	71.7	70.7	79.5	72.1	71.3	71.6	38.0	43.9	44.7	44.8
Oil	68.1	150.0	121.4	124.3	123.5	122.2	117.4	135.4	127.4	123.3	116.5	129.7	119.3	116.7	110.1
Nuclear and Hydro [1]	2.6	11.9	15.4	35.1	35.1	35.1	35.1	73.0	60.1	49.1	38.1	154.8	117.2	86.6	69.2
Biofuels				1.0	0.7	0.7	0.5	3.1	2.3	2.3	1.8	7.7	5.5	5.5	4.2
Renewables				0.1	0.1	0.1	0.1	1.1	0.9	0.9	0.6	9.1	3.4	1.8	1.4
TOTAL ENERGY USES	269.4	335.9	321.8	368.4	349.5	342.5	329.5	431.8	380.9	363.2	328.5	515.3	418.3	390.4	331.9
NON ENERGY USES															
Natural Gas		0.8	6.9	6.4	6.4	6.4	6.4	2.0	2.0	2.0	2.0	0.0	0.0	0.0	0.0
Oil (feedstocks)	7.0	17.0	11.8	17.2	16.3	15.6	15.1	22.3	19.0	17.5	15.5	29.4	22.6	20.2	17.0
Oil (Bunkers)	9.4	9.4	4.2	3.6	3.7	3.7	3.9	4.6	4.4	4.4	4.1	4.8	4.6	4.4	4.4
TOTAL NON ENERGY USES	16.4	27.2	22.9	27.1	26.5	25.8	25.4	28.9	25.5	23.9	21.6	34.2	27.2	24.6	21.4
TOTAL PRIMARY DEMAND	285.8	363.1	344.7	395.6	376.0	368.3	355.0	460.7	406.4	387.2	350.1	549.4	445.5	415.1	353.4

1. Includes Channel Link and pump storage.
2. Includes a small amount of gas.

UK ENERGY PROJECTIONS

Higher Fossil Fuel Price Assumptions

TABLE E

UK FINAL ENERGY DEMAND BY SECTOR AND FUEL

bn therms

DOMESTIC

	1960	1970	1980	1990				2000				2010			
				X	YU	YL	Z	X	YU	YL	Z	X	YU	YL	Z
Solid Fuel	11.3	7.1	3.3	1.7	1.8	1.8	1.8	1.5	1.6	1.6	1.6	1.7	1.8	1.8	1.8
Gas	1.3	3.5	8.4	10.8	10.2	10.1	9.7	10.8	9.9	9.8	8.6	11.5	9.8	9.7	7.9
Electricity	1.1	2.6	2.9	3.0	2.9	2.9	2.8	3.9	3.5	3.5	3.0	5.1	4.2	4.2	3.3
Oil	0.7	1.3	1.1	0.5	0.5	0.5	0.6	0.3	0.3	0.3	0.4	0.2	0.2	0.2	0.2
CHP				0	0	0	0	0.1	0.1	0.1	0.1	0.3	0.3	0.3	0.3
Biofuels				0	0	0	0	0.1	0.1	0.1	0.1	0.4	0.3	0.3	0.2
Renewables				0	0	0	0	0.2	0.2	0.2	0.1	0.4	0.3	0.3	0.3
TOTAL	14.4	14.6	15.8	16.0	15.4	15.4	14.8	17.0	15.7	15.7	13.9	19.6	16.8	16.7	13.8

IRON AND STEEL

	1960	1970	1980	1990				2000				2010			
				X	YU	YL	Z	X	YU	YL	Z	X	YU	YL	Z
Solid Fuel	5.7	4.2	1.4	2.5	2.4	2.0	2.0	2.9	2.7	1.8	1.7	3.4	2.9	1.6	1.5
Gas	0.1	0.2	0.5	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1
Electricity	0.2	0.4	0.3	0.4	0.4	0.3	0.3	0.5	0.4	0.3	0.3	0.5	0.4	0.2	0.2
Oil	1.0	2.3	0.7	0.4	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.0
TOTAL	7.1	7.2	2.9	3.6	3.4	2.9	2.8	3.8	3.5	2.4	2.2	4.1	3.5	2.0	1.9

OTHER INDUSTRY

	1960	1970	1980	1990				2000				2010			
				X	YU	YL	Z	X	YU	YL	Z	X	YU	YL	Z
Solid Fuel	9.1	5.3	2.2	3.5	4.1	4.0	3.4	3.9	5.3	5.0	5.0	4.1	5.9	5.4	6.4
Gas	0.7	1.0	3.9	3.4	3.1	3.0	3.2	2.5	2.2	2.1	1.9	2.0	1.7	1.6	1.3
Electricity	1.3	2.1	2.4	3.1	2.9	2.7	2.5	4.6	3.6	3.1	2.7	6.6	4.4	3.5	2.7
Oil	3.1	8.9	6.1	5.6	5.1	4.9	5.3	5.6	4.6	4.3	4.2	5.3	4.0	3.7	2.9
CHP				0	0	0	0	0	0	0	0	0.1	0.1	0.1	0.1
Biofuels				0.3	0.2	0.2	0.1	0.8	0.6	0.6	0.4	1.9	1.5	1.5	1.0
TOTAL	14.3	17.3	14.6	15.8	15.3	14.8	14.5	17.4	16.3	15.1	14.2	19.9	17.5	15.7	14.4

TRANSPORT

	1960	1970	1980	1990				2000				2010			
				X	YU	YL	Z	X	YU	YL	Z	X	YU	YL	Z
Coal	2.9	0.1	0.0	0	0	0	0	0	0	0	0	0	0	0	0
Electricity	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2
Oil	5.9	11.0	14.0	16.3	15.3	15.3	14.7	17.7	16.4	16.4	14.6	18.7	17.1	17.1	14.9
TOTAL	8.8	11.2	14.1	16.4	15.4	15.4	14.8	17.9	16.6	16.6	14.8	19.0	17.3	17.3	15.1

OTHER CONSUMERS

	1960	1970	1980	1990				2000				2010			
				X	YU	YL	Z	X	YU	YL	Z	X	YU	YL	Z
Solid Fuel	3.1	1.7	0.6	0.4	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.3	0.5	0.5	0.6
Gas	0.5	0.8	2.1	2.7	2.6	2.6	2.4	2.5	2.3	2.3	2.1	2.2	2.0	2.0	1.8
Electricity	0.6	1.4	1.9	2.2	2.0	2.0	1.8	2.8	2.4	2.4	1.9	3.7	2.8	2.8	2.0
Oil	1.7	3.6	2.9	2.0	2.0	2.0	2.2	1.9	1.8	1.8	1.8	2.0	1.8	1.7	1.5
CHP				0	0	0	0	0	0	0	0	0.1	0.1	0.1	0.1
Biofuels				0	0	0	0	0.1	0.1	0.1	0.1	0.4	0.4	0.4	0.2
Renewables				0	0	0	0	0.1	0.1	0.1	0	0.1	0.1	0.1	0.1
TOTAL	5.9	7.4	7.5	7.3	7.1	7.1	6.9	7.8	7.2	7.2	6.5	8.9	7.7	7.6	6.4

UK ENERGY PROJECTIONS

Lower Fossil Fuel Price Assumptions

UK FINAL ENERGY DEMAND BY SECTOR AND FUEL

TABLE F

bn therms

DOMESTIC

	1960	1970	1980	1990				2000				2010			
				A	BU	BL	C	A	BU	BL	C	A	BU	BL	C
Solid Fuel	11.3	7.1	3.3	1.9	2.0	2.0	2.0	1.8	1.8	1.8	1.6	2.0	1.9	1.9	1.5
Gas	1.3	3.5	8.4	11.1	10.2	10.2	10.0	12.5	11.2	11.1	10.9	13.3	11.3	11.4	10.9
Electricity	1.1	2.6	2.9	3.1	3.0	3.0	2.9	4.1	3.5	3.5	2.9	5.2	4.0	4.0	2.9
Oil	0.7	1.3	1.1	0.6	0.8	0.8	0.8	0.5	0.5	0.5	0.6	0.3	0.3	0.3	0.3
CHP				0	0	0	0	0.1	0.1	0.1	0.1	0.3	0.3	0.3	0.3
Biofuels				0	0	0	0	0.1	0	0	0	0.2	0.2	0.2	0.1
Renewables				0	0	0	0	0.2	0.2	0.2	0.1	0.4	0.3	0.3	0.3
TOTAL	14.4	14.6	15.8	16.8	16.1	16.1	15.8	19.2	17.3	17.2	16.2	21.7	18.3	18.3	16.2

IRON AND STEEL

	1960	1970	1980	1990				2000				2010			
				A	BU	BL	C	A	BU	BL	C	A	BU	BL	C
Solid Fuel	5.7	4.2	1.4	2.5	2.4	2.0	2.0	2.9	2.7	1.8	1.7	3.6	2.9	1.6	1.5
Gas	0.1	0.2	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1
Electricity	0.2	0.4	0.3	0.4	0.4	0.3	0.3	0.5	0.4	0.3	0.3	0.5	0.4	0.2	0.2
Oil	1.0	2.3	0.7	0.4	0.4	0.3	0.2	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1
TOTAL	7.1	7.2	2.9	3.7	3.6	3.0	2.9	4.0	3.6	2.4	2.3	4.2	3.6	2.0	1.9

OTHER INDUSTRY

	1960	1970	1980	1990				2000				2010			
				A	BU	BL	C	A	BU	BL	C	A	BU	BL	C
Solid Fuel	9.1	5.3	2.2	3.4	2.8	2.7	2.6	4.8	3.5	3.3	2.1	5.7	4.8	4.4	2.2
Gas	0.7	1.0	3.9	3.6	3.7	3.6	3.7	2.7	2.7	2.6	2.8	2.1	2.1	2.0	2.4
Electricity	1.3	2.1	2.4	3.2	2.8	2.7	2.5	4.8	3.6	3.1	2.7	6.9	4.5	3.5	2.7
Oil	3.1	8.9	6.1	6.2	6.7	6.5	6.7	6.2	6.6	6.3	7.2	5.4	5.6	5.2	6.7
CHP				0	0	0	0	0	0	0	0	0.1	0.1	0.1	0.1
Biofuels				0.2	0.2	0.2	0.1	0.6	0.5	0.5	0.3	1.4	1.0	1.0	0.8
TOTAL	14.3	17.3	14.6	16.7	16.2	15.7	15.5	19.1	16.9	15.7	15.2	21.6	18.1	16.2	14.8

TRANSPORT

	1960	1970	1980	1990				2000				2010			
				A	BU	BL	C	A	BU	BL	C	A	BU	BL	C
Coal	2.9	0.1	0.0	0	0	0	0	0	0	0	0	0	0	0	0
Electricity	0.1	0.1	0.1	0.1	0.1	C 1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2
Oil	5.9	11.0	14.0	16.5	15.6	15.6	14.8	18.3	16.8	16.8	14.9	19.2	17.5	17.5	15.2
TOTAL	8.8	11.2	14.1	16.6	15.8	15.8	15.0	18.4	16.9	16.9	15.1	19.4	17.6	17.6	15.3

OTHER CONSUMERS

	1960	1970	1980	1990				2000				2010			
				A	BU	BL	C	A	BU	BL	C	A	BU	BL	C
Solid Fuel	3.1	1.7	0.6	0.5	0.6	0.6	0.5	0.6	0.5	0.5	0.4	0.6	0.5	0.5	0.2
Gas	0.5	0.8	2.1	2.7	2.3	2.3	2.3	2.9	2.5	2.5	2.6	2.8	2.5	2.5	2.5
Electricity	0.6	1.4	1.9	2.3	2.1	2.1	1.9	3.0	2.5	2.5	2.0	3.8	2.9	2.9	2.1
Oil	1.7	3.6	2.9	2.3	2.7	2.7	2.8	2.2	2.2	2.1	2.3	2.2	2.0	1.9	1.9
CHP				0	0	0	0	0	0	0	0	0.1	0.1	0.1	0.1
Biofuels				0	0	0	0	0.1	0.1	0.1	0.1	0.3	0.3	0.3	0.2
Renewables				0	0	0	0	0.1	0.1	0.1	0	0.1	0.1	0.1	0.1
TOTAL	5.9	7.4	7.5	7.8	7.7	7.7	7.5	8.8	7.8	7.8	7.4	10.0	8.3	8.2	7.1

cc

DEPARTMENT OF THE ENVIRONMENT
2 MARSHAM STREET
LONDON SW1P 3EB
01-212 3434

MINISTER FOR LOCAL GOVERNMENT
AND ENVIRONMENTAL SERVICES

Prime Minister (2)

My Ref: H/PSO/16544/82

MLS 1/10

1 October 1982

Dear Secretary of State,

Your letter of 23 September to Geoffrey Howe sought agreement to the publication of a new set of energy projections, with some minor amendments you mentioned.

I realise there is a commitment to produce such projections for the purposes of the Sizewell inquiry. I welcome that as a contribution to informed public debate on the issues involved, provided the limitations of projections of this kind are adequately brought out. To avoid any implication that the inquiry is being prejudiced, I suggest the introduction should reiterate what you have said elsewhere, that there is no Government commitment to a programme of power station construction, and the point made in paragraph 7 about the choice of fuel by consumers on the basis of comparative costs should also be made in paragraph 6 about the generating boards.

I am also concerned about the reaction to the highest cases for future nuclear capacity. You will be aware that these are much higher than the figures CEGB have submitted to the inquiry, and they are likely to provoke a good deal of fresh controversy over two subjects with which my Department is very much involved: radioactive wastes and the sites for the power stations.

At this stage I would not want to suggest reopening the detailed calculations. However, what are by a long way the highest figures for nuclear capacity, arrived at from an unconstrained comparison of expected costs and contained in table 8, are discounted in the text (paragraph 46) and do not form part of the final projections (this means for example that their implications for other fuels are not spelt out). However, there is a real risk that they will be quoted out of context, and it would seem better to regard them as an intermediate step in the calculations (to which a general reference could still be made), and omit them from what is published. With these provisos, I accept what you propose.

Copies of this letter go to the recipients of yours.

Yours Sincerely,
M.L. Brasher (Private Secretary)

(pp) TOM KING

9/IV
Energy

SECRETARY OF STATE FOR ENERGY
THAMES HOUSE SOUTH
MILLBANK LONDON SW1P 4QJ
01-211 6402

NBPM
TLS 1/10

Miss Jill Rutter
Private Secretary to the
Chancellor of the Exchequer
HM Treasury
London SW1

30 September 1982

Dear Jill,

SIZEWELL 'B' INQUIRY: DEPARTMENT OF ENERGY PROOF OF EVIDENCE

My Secretary of State wrote to the Chancellor on 28 September, covering a draft proof of the Department of Energy's evidence to the Sizewell Inquiry.

He has asked me to circulate the attached revision to paragraph 12, which replaces that in the previous text.

Yours ever

Jeremy Clayton

JEREMY CLAYTON
Private Secretary

Ps. I am copying this to Private Secretaries to members of E and to Richard Hatfield.

"As was made clear in last year's White Paper on Nuclear Power (Cmnd 8317, published in July 1981), the Government considers it prudent for the country to have a range of supply options. In this context it sees an important and necessary role for nuclear power which will develop in the years ahead as older electricity generating plant is retired. The Government accordingly expects the electricity supply industry to pay due regard in its planning to the need for diversity and security in supply, including an appropriate nuclear component."

CJV

NBPM
MCS 1/10

Treasury Chambers, Parliament Street, SW1P 3AG
01-233 3000

29 September 1982

The Rt. Hon. Nigel Lawson, MP
Secretary of State for Energy,
Department of Energy

Dear Nigel

ENERGY PROJECTIONS 1982

You wrote to me on 23 September with a copy of a set of Energy Projections prepared by your Department as part of its evidence for the Sizewell Inquiry. I note that one or two changes still need to be made to the draft, as explained in your letter.

I am content that the projections, as amended, should be supplied to the participants in the Sizewell Inquiry.

I am sending copies of this letter to members of E Committee and to Sir Robert Armstrong.

Yours

GEOFFREY HOWE

JV

NBPM

MES 7/10

Treasury Chambers, Parliament Street, SW1P 3AG
01-233 3000

29 September 1982

The Rt. Hon. Nigel Lawson, MP
Secretary of State for Energy,
Department of Energy

Dear Nigel

ENERGY PROJECTIONS 1982

You wrote to me on 23 September with a copy of a set of Energy Projections prepared by your Department as part of its evidence for the Sizewell Inquiry. I note that one or two changes still need to be made to the draft, as explained in your letter.

I am content that the projections, as amended, should be supplied to the participants in the Sizewell Inquiry.

I am sending copies of this letter to members of E Committee and to Sir Robert Armstrong.

Yours

GEOFFREY HOWE

EC SL Energy

SECRETARY OF STATE FOR ENERGY
THAMES HOUSE SOUTH
MILLBANK LONDON SW1P 4QJ

01 211 6402

28/9.

The Rt Hon Sir Geoffrey Howe QC MP
Chancellor of the Exchequer
HM Treasury
Parliament Street
London
SW1

28th September 1982

SIZEWELL 'B' INQUIRY: DEPARTMENT OF ENERGY PROOF OF EVIDENCE

You have already received, under cover of my letter of 23 September, a copy of the energy projections I propose to put to the Sizewell Inquiry. I intend that the projections should form an annex to my Department's proof of evidence which I now attach. The proof makes no attempt to cover all aspects of energy policy, but only those issues which, in my view, are relevant to the Inquiry.

The proof is to be tabled on 4 October. If colleagues wish to make any observations I should be grateful if this timetable could be borne in mind.

I am copying this letter to members of 'E' and Sir Robert Armstrong.

NIGEL LAWSON

DEPARTMENT OF ENERGY DRAFT PROOF OF EVIDENCE
FOR THE SIZEWELL 'B' INQUIRY

This proof of evidence will be presented by Mr R J Priddle, an Under-Secretary in the Department of Energy and Head of the Energy Policy Division.

1 The Department of Energy's responsibilities derive from the duties placed on the Secretary of State by Parliament. These are generally described in the Ministry of Fuel and Power Act 1945 as extended by the Continental Shelf Act 1964. These make the Secretary of State for Energy responsible "for securing the effective and co-ordinated development of coal, petroleum and other minerals and sources of fuel and power in Great Britain and in the Continental Shelf and for promoting economy and efficiency in the supply, distribution, use and consumption of fuel and power". In the first section, this proof of evidence describes the general policy framed to discharge these responsibilities. In the second section, and against this background, it explains the Government's approach to electricity supply and the role of thermal nuclear power within the electricity supply system.

Energy Supply and Demand: the Government's approach

2 A major aim of the Government's overall economic policy is to set the right conditions to enable the supply side of the economy to operate more competitively and efficiently. A crucial element of that policy is to remove, where practicable, obstacles to the free operation of market forces throughout the economy. In the energy sector, where available resources and distribution networks are concentrated substantially in the hands of public sector monopolies, the market is far from free and competitive. The thrust of Government policy in this sector therefore is to remove market distortions where possible or otherwise to seek to ensure that the energy market operates as nearly as possible as a free market. Such an energy market will regulate energy supply and demand with greater success and efficiency than relying on central planning as the means of ensuring that UK supply meets demand.

/3 Steps which

3 Steps which the Government is taking to this end include transferring functions from the public to the private sector, reducing the monopoly powers of the nationalised industries and, where those industries are not and cannot by their nature be fully exposed to market forces, introducing alternative disciplines. Examples of this policy are the sale of Britoil, the weakening of the British Gas Corporation's monopoly and the investigations of efficiency conducted on behalf of the Government by the MMC or other consultants.

4 The facts that we operate in a world market not only for oil but increasingly for coal and gas, and that that market is unstable and not greatly susceptible to Government influence underlines the Government view that the UK cannot work to a set blue print of energy development. For example, a sharp escalation in the price of oil enhances demand for other fuels and requires a flexible response. Access to international markets means that energy supply investment options need not be constrained by a requirement exactly to match UK energy production to energy demand.

5 The public sector energy industries in the UK have their own responsibility for drawing up plans designed to sustain their supply obligations. The Government, in discharge of its responsibilities for public expenditure, evaluates these plans in the light of its own knowledge, but without attempting to match the detailed expertise of the industries. Energy projections have a role in testing energy supply investment proposals; and the latest set of the Department of Energy's projections is attached at Annex 1. But there are many uncertainties in such projections. They are not forecasts and they need to be continually reviewed and revised to take account of changing circumstances.

6 It is central to this market-oriented approach that energy should be priced realistically since interaction between supply and demand is mainly determined by price. If prices are artificially low, energy is used wastefully and consumers lack the

/incentive

incentive to invest in efficiency. If they are too high, consumers suffer needlessly, while producers are encouraged to invest in unnecessary new capacity. To minimise these distortions, energy pricing is discussed with the nationalised industries in formulating their financial targets, on the basis that prices should reflect market pressures where reasonably open markets exist, or the costs of supply in other cases. The Government considers it is then up to the consumer to rank his own investment priorities in the light of prevailing prices. Energy efficiency and supply investments are both necessary, but the Government does not seek to take to itself the decisions of millions of consumers. When the Government has to assess investment in supply, full account is taken of possible future price movements and technical change, and the consequential effects on demand.

Electricity

7 As with other fuels, the Government's objectives for electricity are that there should be secure supplies, provided to the consumer at the lowest possible cost. The Government's approach to achieving these objectives differs in some respects from its approach to the other energy industries. With electricity, it is more difficult - and will continue to be so - to sell surpluses, or make good shortfalls in supply, since the scope for international trade is limited to sales through interconnectors between adjacent national grids; and there are a number of uses where electricity is not interchangeable with other fuels.

8 The Central Electricity Generating Board, who have a statutory duty '... to develop and maintain an efficient co-ordinated and economical system of supply of electricity in bulk for all parts of England and Wales, ...' have to take account of these limitations in their planning. So too does the Government in considering the industry's capital programme.

/9 Against this

9 Against this background, the Government seeks to ensure that the electricity supply industry makes as thorough and realistic an appraisal of future demand as possible; that its plans offer the prospect of meeting that demand as economically as possible; that these plans offer sufficient flexibility to provide a reasonable degree of security; and that public expenditure considerations are properly taken into account. The Department does not duplicate the CEGB's calculations. But it must satisfy itself about the validity of the Board's methodology and in the case of major investments subject to the Department's approval to test the robustness of the proposals to different assumptions.

10 The energy crises of the last 10 years have shown the danger of over-dependence on one fuel, and the wisdom of a sensible degree of diversity of supply. Despite considerable research work in the UK and internationally on alternative and/or renewable sources of energy, on fast reactors, and on nuclear fusion, and the Government's encouragement of increased private generation and economic combined heat and power schemes, the Government considers that the only available and economic options for new secure base-load generating capacity at present are coal-fired or thermal nuclear power stations.

11 In 1981/82, 83% of the CEGB's generation was from coal - which also dominated baseload generation. By comparison nuclear accounted for some 12%. The nuclear output will increase, probably to around 20%, when those nuclear stations now under construction are fully commissioned. However unless new stations are ordered in the 1980s the nuclear power component will progressively decline as older nuclear stations are retired.

12 As was made clear in last year's White Paper on nuclear power (Cmnd 8317, published in July 1981) the Government considers it prudent for the country to have a range of supply options including nuclear power. Successive Governments have taken a similar view. The Government accordingly expects the electricity supply industry to pay due regard in its planning

/to the need

to the need for diversity and security in supply, including an appropriate nuclear component.

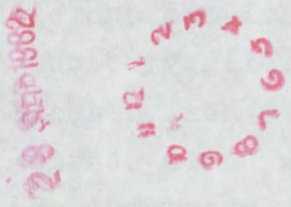
13 Nuclear power has the potential to produce electricity more cheaply than fossil fuels provided that new power stations can be built to time and cost. This is of importance, not only to individual electricity consumers but - through its influence on industrial competitiveness - to the economy as a whole.

14 Safety is paramount. The operational responsibility rests with the CEGB. It is the responsibility of the Nuclear Installations Inspectorate as part of the Health and Safety Executive to decide whether or not a new power station has been designed and built to the necessary standards and can be operated safely.

15 Government policy is to encourage the electricity industry to ensure that there is a reliable, safe and cost-effective reactor system available for ordering as necessary. In 1977, the CEGB declared its intention of establishing the PWR as a valid option; this intention was endorsed by the previous administration; and the present Government, in confirming its agreement to this in 1979, took the view that subject to the necessary consents and safety clearances, a PWR should be the next nuclear power station order.

16 This general statement of policy in no way pre-empts the particular decision on the proposed Sizewell 'B' power station; and the Government welcomes the examination at the Public Inquiry of the issues set out in the Rule 5 Statement.

Energy, Policy, Pt 7



CONFIDENTIAL

Energy Projections at Stragwell

FCS/82/143

SECRETARY OF STATE FOR ENERGY

1. Thank you for sending me a copy of your letter of 23 September to the Chancellor, with the set of energy projections.

2. Others are better placed than I am to comment on the wisdom in domestic terms of not publishing projections which could be made if we chose and which might leak. On the foreign policy side I am concerned about the repercussions that will follow from our resulting inability to give to the IEA and the European Commission individual fuel supply projections, particularly for gas. Both bodies have been accustomed to receiving supply projections from us in the past, and we have referred at both to the preparation of these latest projections, so our failure to provide relevant figures will not be readily understood.

3. My particular concern is with the IEA gas study. As you are aware, George Shultz has proposed alternative energy sources as an item for discussion among the Foreign Ministers of the Five and this is likely to concentrate on alternative gas supplies. We will be taking the line that the IEA gas study, perhaps under some sort of NATO umbrella, will meet this requirement. The study was commissioned as a result of an American initiative, and has always been closely and directly linked with the Siberian pipeline debate. The Americans and our European partners can both be expected to be upset if we fail to cooperate fully with the study, and fail to provide figures which they know we are likely to have available.

/4.

4. In these circumstances I hope you will be able to agree to your officials passing at least the gas supply projections to the IEA Secretariat and to the European Commission on a confidential basis, and not for publication.

5. On the Community side I accept that their gas study will be less affected and that we have already provided many of the figures on gas supply that they need. Nevertheless, our partners there may be less helpful over our planned Community coal initiative if they think we are being uncooperative over the provision of information to them. I hope, therefore, that we can pass on a similar confidential basis our individual supply projection to them.

6. I am copying this to the members of E Committee and to Sir R Armstrong.

(FRANCIS PYM)

Foreign and Commonwealth Office
27 September 1982

Prime Minister (2)

MLS 27/9

01 211 6402

The Rt Hon Sir Geoffrey Howe QC MP
Chancellor of the Exchequer
HM Treasury
Parliament Street
London
SW1

23rd September 1982

Dear Chancellor

My Department has prepared the attached set of energy projections as part of the Department of Energy's evidence for the public inquiry into the construction of a Pressurised Water Reactor at Sizewell.

I have made my views on energy projections clear publicly on a number of occasions. No-one can predict with any confidence what UK energy production will be in twenty or thirty years time. But, for the most part, we do not need to. Oil, and increasingly coal and gas are internationally traded. Because we have access to international supplies, UK energy supply investment need not be constrained by a need to match UK energy production to energy demand, and investment decisions can be made on the basis of whether the project offers a worthwhile return.

There are therefore no figures given in the projections for future UK energy production, except for electricity where opportunities for trade are more constrained than for other energy sources.

The projections examine the possible development of energy demand in the UK up to 2010, covering a wide range of assumptions about future economic growth and world fossil fuel prices, with alternative cases on how the structure of the UK economy might develop. Earlier drafts were discussed with the nationalised energy industries, and circulated at official level in the first half of August.

One or two last minute changes are still outstanding. The most important of these relate to the power station build projected in the paper. I have asked officials to incorporate two improvements. The first is to change the basis of the power station build figures in Table 7 so that they refer to stations not yet ordered and exclude both the refurbishment of existing

stations and plant already under construction. The second is to give a less monolithic look to the nuclear figures in the four "central" cases; at the moment each of these assumes a 15GW build in the 1990s; there is however a case which shows a 10GW build in this period, and I have asked that this be substituted for the case at present shown as BL. Your officials might also note that the overall range of the projections has been increased by reducing the oil price profile for the lowest case, Case C.

The Inspector at the Sizewell 'B' Inquiry, Sir Frank Layfield, has asked that the projections be made available to Inquiry participants in good time for the next preliminary Inquiry meeting on 18 October. In practice this means we must release the projections two weeks beforehand, on 4 October. If we do not adhere to this timetable, the Inspector has made clear that he may have to delay the start of the Inquiry main hearing. It is most important that this is avoided; I must therefore ask for any comments by Thursday, 30 September.

Copies go to Members of E Committee, and to Sir Robert Armstrong.

Yours sincerely

NIGEL LAWSON
(Approved by the Secretary of State and signed in his absence)

CONFIDENTIAL

COPY NO. 1

DRAFT 22 SEPTEMBER 1982

ENERGY PROJECTIONS
1982

THESE PROJECTIONS ARE PROVISIONAL AND NOT TO BE RELEASED OR USED IN INTERNAL WORK UNTIL CONFIRMED FOR PUBLICATION.

A PAPER BY THE
DEPARTMENT OF ENERGY.

ENERGY PROJECTIONS 1982

CONTENTS

ENERGY PROJECTIONS 1982

SUMMARY

The Department of Energy keeps under review the future prospects for energy in the United Kingdom and publishes its findings from time to time. Some three years have elapsed since the publication of Energy Projections 1979. During that time the prospects for economic growth have become less optimistic and the world oil market has weakened. The background to the 1982 round of projections is therefore very different from that which underlay the 1979 exercise.

There are other differences too. The present projections are based on a methdology which differs in important respects from that used in 1979. Market prices for fuels are now used explicitly as one of the factors determining the demand for fuels.

These projections have been prepared as part of the Department of Energy's evidence for the Sizewell Inquiry. Their objective is to explore a reasonably wide range of possible developments for UK energy demand into the first decade of the next century and the likely implications for electricity supply.

The balance of UK supply and demand for electricity has been examined in some detail. This type of analysis is not necessary for the primary fuels for which, in the longer run, trade could build up either to supplement UK supplies or to provide profitable exports.

The uncertainties involved in looking ahead over as long a period as thirty years are very great and there is a need to look at a wide range of possible outcomes. The attached table summarises the range of projections considered.

Eight cases have been analysed in detail covering future economic growth in the UK from ½% - 2½% pa, two alternative developments of UK industrial and economic structure and a wide range of future world fossil fuel prices.

In the extreme cases total primary energy demand may either rise at an average rate of some 1.6% or fall slightly to the year 2010.

In all cases, however, there are opportunities for those energy industries which can achieve efficient operation, profitable performance and satisfactory rates of return on new investment. These opportunities will be assesed on an

individual basis in the circumstances of the time, bearing in mind the future uncertainties involved. Such investments will have to satisfy economic criteria whilst taking proper account of social and environmental requirements.

The energy projections provided here explore a wide range of possible outcomes which form part of the backcloth against which energy policy decisions can be considered.

SUMMARY TABLE

	1980	1990	2000	2010
ENERGY DEMAND (incl.non-energy use)				
Electricity twh	231	229-274	240-372	241-494
Coal m tonnes	121	105-131	100-140	80-176
Oil m tonnes	81	73-85	69-95	65-96
Gas bn therms	18	19-21	15-20	12-19
Total Primary Energy Demand mtce	345	339-396	328-461	327-549

NOTE: Figures do not add vertically. They include own use and losses in production and distribution.

ENERGY PROJECTIONS 1982

I INTRODUCTION

1. These Projections have been prepared as part of the Department of Energy's evidence for the Sizewell Inquiry. They explore a reasonably wide range of possible developments for UK energy demand into the first decade of the next century. This range is based on a number of combinations of economic assumptions which have been chosen to point up the different ways in which that demand might develop.

2. The assumptions themselves - and the Projections developed from them - are necessarily very uncertain. The assumptions include: the level of world economic activity; the internationally traded prices of oil, coal and gas; the growth and structure of the UK economy, in particular the balance between the manufacturing and service sectors.

3. The last set of Energy Projections was published by the Department in December 1979. Since that time prospects for economic growth have become less optimistic and the world oil market has weakened. The recession has significantly affected the structure of the British economy. The background to the current round of Projections is therefore very different from that which underlay the 1979 exercise.

4. The changes which have occurred over the last three years underline the importance of looking at a range of possible futures, and of the dangers inherent in trying to select any one of them. Take for instance the higher growth rate tested over the 30 year period 1980-2010. On the one hand, although it was an exception in British economic history, such growth was achieved in the UK in the 25 years after the Second World War. On the other hand, seen against what has occurred in the last 10 years, it could be regarded as unrealistically high. But that is not to say that any of the other cases studied should be regarded as a central or preferred case. They are each merely useful points on the range studied, and serve to illustrate the radical effect of change on only one or two key assumptions.

5. Not only is it unwise to take a single view of the future, it is also unnecessary to envisage supplying the country's energy needs totally from domestic production. This country has a long history as a trading nation. It may prove economic to import some fuels which are expensive to produce at home and to plan for profitable exports where suitable opportunities arise. Furthermore, future mis-matches of demand and supply

for tradable energy products may be accommodated by imports and exports at world prices. For this reason it is unnecessary to produce projections for future supplies of the primary fuels. Individual investments in the nationalised industries producing these fuels will be considered on an individual basis in the circumstances then current to ensure that they earn a satisfactory return on capital.

6. Opportunities for international trade in electricity are limited, although these should not be completely discounted. Unexpected future mismatches of demand and supply of electricity are not easily accommodated by imports or exports at the margin, unlike other more easily tradable energy products. Supply investment for electricity therefore needs to be set against the background of projections of electricity demand, to minimise the risk of significant over or under supply. Electricity demand must be analysed within the demand for all types of fuel.

7. Although government policies can have some impact, most of the decisions which shape the future level and structure of energy demand are determined by market forces. Consumers decide their choice of fuel and its efficiency in use largely in the light of their income or level of activity and the fuel and equipment prices in the market. The projection method takes into account the effects of energy prices on energy use and corresponding increases in the efficiency of energy consumption.

8. The energy projections set out in this paper present the Department of Energy's present view on possible energy future, as a framework for policy considerations in government.

II PROJECTION METHOD

9. The methods employed in preparing the energy projections are outlined in Annex I to this paper [and are described in detail in a separate accompanying paper]. A number of major improvements have been made to the methods used for earlier projection exercises. The most important development has been the redesign and estimation of the energy demand calculation in which market prices now play an explicit role, along with economic activity, in determining the demands for each fuel in each consuming sector. The new method for calculating energy demands has been discussed at a number of public meetings of academic groups and energy institutions.

10. For a given set of assumptions, including those for fossil fuel prices, detailed projections of demand for the main fuels; solid fuel, oil, gas and electricity have been prepared for each of the consuming sectors; domestic, iron and steel, other industry, transport, other consumers and non-energy uses. The consequences for the supply of electricity are then prepared. Equilibrium is established between the supply and demand for electricity at the calculated electricity prices in each projection year using an iterative calculation as outlined in Annex 1.

Energy Conservation

11. The explicit role of market prices in determining energy demand removes the need for a separate allowance for energy conservation. No attempt is made, in preparing the projections, to account for the effects of individual conservation measures.

12. The method used for calculating energy demand has two important features. If fuel prices rise at the same rate as general price inflation (i.e. constant real fuel prices) then total demand for energy tends to rise less quickly than economic activity (GDP). This non-price effect arises mainly as a result of technical change. The second feature involves additional energy savings as fuel prices rise faster than general inflation. In this case other inputs (such as capital for additional insulation or improved boiler contols) are substituted for energy as fuel prices rise relative to other goods. In addition consumers tend to use relatively less energy, to use it more efficiently and to undertake more energy conservation measures, the faster energy prices rise in real terms. In this way the 'price' and 'non-price' components of increasing efficiency in energy use are incorporated into the projections. Quantitative estimates of the reduction in energy use from rising real energy prices in the projections are provided at paragraphs 31-33 below.

III ASSUMPTIONS

13. Projections of future energy demands in the United Kingdom are based on assumptions about world economic activity, world energy prices, the growth and future structure of the British economy and real exchange rates.

14. These assumptions are interdependent. At any given future levels of world supplies of energy a faster long-term rate of growth in the world economy will place more pressure on energy supplies and lead to higher energy prices. In addition, the importance of international trade to Britain implies that faster world economic growth will, as in the past, also lead to a higher rate of economic growth in this country.

15. It is sometimes suggested that high world energy prices would prevent the achievement of high rates of economic growth. Although high energy prices are likely to place some contraints on economic activity, the fundamental forces generating economic growth arise, in the main, outside the energy sector. Account has been taken of these factors in choosing assumptions for economic growth and increases in real energy prices. While temporary output losses may follow from world energy price shocks, over the longer term market will adjust with increased energy conservation, inter-fuel substitution and the discovery and exploitation of new energy supplies on the one hand and with increased absorption and recycling of any financial imbalances on the other.

Energy Price Assumptions.

16. However, future levels of world energy supplies and the efficiency with which energy is used world-wide are also uncertain. For this reason two sets of assumptions for fossil fuel prices at the world level have been taken. Expressed as growth rates in OPEC crude oil marker prices in 1980 prices (deflated by the unit price index of world exports of manufactures by industrial countries) to the year 2000, the higher fossil fuel price range covers 2.9% to 5.4% pa and the lower range covers -0.7% to 2.7% pa. These crude oil price movements are translated into sterling terms and converted to market prices for petroleum products in the UK using refining and distribution margins.

17. The delivered prices of NCB coal are currently close to the sterling cost of imported coal for most consumers and this relationship is expected to continue. Future paths for UK coal prices have been prepared in association with the oil price assumptions. For the low end of both oil price assumption sets, in the medium to long term, world coal prices are based on estimates of the marginal production cost of coal. At higher oil prices in each assumption set world coal prices are expected to be higher than the marginal production costs of coal as a result of competition with oil in end uses.

18. In the projections it is assumed that the price of gas landed in Britain will move broadly in line with gas prices in European markets and that these will be related to prices of competing oil products. Distribution margins are added to arrive at final consumer prices.

19. Final consumer prices for electricity are calculated in the projections from marginal generating costs based on the other fuel price assumptions.

20. The detailed price assumptions for all fuels are listed at Table A.

Economic Growth Assumptions

21. Three views of possible future UK economic growth have been adopted. A high rate of 2½% per annum GDP growth is slightly less than that achieved between 1948 and 1972. An intermediate rate of 1½% p.a. GDP growth is close to the long-run average rate of the last 80 years. A low growth assumption of ½% p.a. is broadly similar to that achieved during the depressed conditions since 1973. For each of these views the path of GDP assumes lower growth during the first half of the 1980s and a correspondingly faster rate over the rest of the period to 2000. Beyond 2000 the average growth rate for GDP in each case has been adopted.

Assumptions for Economic and Industrial Structure

22. For each GDP growth rate path, alternative combinations of more and less energy intensive industries within manufacturing, and of manufacturing and service sectors, can lead to significantly different energy demands. A range of assumptions concerning the outputs of these sectors has been selected to span the greater part of the uncertainty. It should be stressed that these assumptions made by the Department of Energy are purely for the purposes of testing the sensitivity of impacts on energy demand. There is no presumption

that the output trends indicated are planned to arise from Government policies or that the Government thinks that these output levels will or should arise in the future. In any case, ideally, an integrated economic model covering the whole economy would be used to investigate alternative economic structures. No such suitable model was found to be available for this purpose.

23. As an alternative an analysis has been made of the performance of the major energy using industries over past periods of faster and slower general economic growth. The results of this analysis have provided, for each GDP growth assumption, both a high and a low assumption for the growth rates of those industries, with the less energy intensive industrial and service sectors making up the assumed future levels of GDP. Both industrial structure assumptions have been adopted for the central GDP growth case yielding two separate projections. The high GDP growth/low energy intensive structure case and the low GDP growth/high energy intensive structure case have been omitted as their energy projections would fall within the range of energy demands of the other cases.

Exchange Rate Assumptions

24. The exchange rates assumed in these projections should not be regarded as forecasts, but as assumptions about long term trends in the relative real values of different currencies. They are real rates of exchange corrected for differences in rates of inflation of the currencies concerned, and expressed in terms of the real value of the US dollar as it stood in 1980 as against an appropriate basket of currencies. The path of this particular real sterling exchange rate over the period 1980 to 2010 will be subject to a number of influences. It may rise or fall with the value of NS oil production implying a sensitivity to both the volume of oil production and to real oil prices. More rapid economic growth in the UK tends to be associated with better non-price competitiveness and hence with a higher real effective exchange rate. In the short term the success of the Goverment's policy in reducing inflation will reduce real effective sterling exchanges rates since the lower the price level the lower the real rate corresponding to a given nominal rate. These considerations together with the small reduction which has occurred since 1980, in the real effective sterling exchange rate , form the basis of the exchange rate assumptions used in these projections.

The Projection Cases

25. The separate sets of assumptions which underlie the main projections are set out schematically in Table 1 and are listed in detail in Tables A and B. Eight separate projections are provided, as indicated in Table 1, representing the various combinations of assumptions adopted for world energy prices, UK economic growth and economic and industrial structure. The energy projections for each case presented in this paper are identified by the labels given at the head to Table 1, namely X, YU, YL, Z, A, BU, BL, and C. Thus in Cases X and A, high world economic growth generates high world prices for the traded fossil fuels and contributes to high UK economic growth. The other cases are characterised by corresponding combinations of such assumptions.

TABLE 1

ASSUMPTIONS FOR THE PROJECTIONS CASES.

CASES	X	YU	YL	Z	A	BU	BL	C
World Fossil Fuel price assumptions		High	Set			Low Set		
World Oil Price in 2000 $ / bbl	88	65	65	55	52	43	43	27
UK GDP Growth % pa	2½	1½	1½	½	2½	1½	1½	½
UK industrial growth	high	high	low	low	high	high	low	low

IV PROSPECTS FOR ENERGY DEMAND

Final Energy Demand

26. Projections of total final energy delivered to energy consumers for the eight projection cases are set out in Table 3. These totals are subdivided into totals for consuming sectors and for fuels in Panels 1 and 2 of Tables C and D at the end of the paper.

27. The projections in Table 3 are determined by the assumptions underlying each case, ie by the rate of rise of energy prices in real terms and by the economic growth and industrial structure assumptions. In all cases the average annual rates of growth in total final energy demand over the projection period are substantially less than the assumed GDP growth rates over the same period. These growth rates may be compared with the corresponding rates for the two decades of the 1960s and 1970s set out in Table 2.

TABLE 2

HISTORIC GROWTH IN ENERGY DEMAND ECONOMIC ACTIVITY AND REAL ENERGY PRICES

% pa

	1960-1970	1970-1980
Total final energy	1.34	-0.52
Total primary energy	2.42	-0.52
Gross Domestic Product	2.89	1.60
Manufacturing production (excluding North Sea activity)	2.93	-0.30
Real energy prices		
Domestic[1]	0.1	-0.7
Industrial[2]	-1.0	4.3

1 deflated by retail price index
2 deflated by wholesale output price index

28. As can be seen from Table 2 the experience of the last two decades has shown wide variation in the rate of growth of energy demand. The main factors have been the variation in economic growth (GDP), the wide divergence between economic growth and manufacturing production, particularly for the large energy users, and the rapid rise in real industrial energy prices over the 1970s. However, domestic consumers have been protected from increases in the price of most fuels, mainly by falls in the real price of gas. The projections of growth in total final energy demand can be seen to fall within the range of the experience of the last two decades.

29. The projections for individual fuels within the totals for final energy demand can be seen in the second panels of Tables C and D. The direct consumption of solid fuel is expected, in the main, to increase over the projection period, except in Case C. In the higher fossil fuel price assumption cases gas consumption increases during the 1980s and then declines over the period to 2010 as its price increases in real terms. However, with lower gas price assumptions in Cases A, BU, BL and C, gas demand rises to 1990 and then mainly remains flat to the end of the projection period. Electricity consumption increases in all the projections apart from Cases C and Z where the increases are small. The direct demand for oil products rises from 1980 in some projection cases and falls in others as the increase in demand for transport purposes offsets subtitution out of oil for bulk heating uses to a greater or lesser extent. The direct consumption of biofuels and renewable sources, mainly in the form of solid fuel waste, is assumed to provide a small contribution to final energy use by 2010.

30. The position of gas inthe industrial market is uncertain because it is difficult to take account of the possible effects of the Oil and Gas (Enterprise) Act as it is too early to assess the timing and extent of its impact. Moreover, the analytical approach used, which is dependent in large part on historical experience, is unable to reflect fully the effect of opening this market to greater competition and, in particular, the removal as a result of the Act of current unsatisfied demand. The results are therefore subject to greater uncertainty than has been the case previously. Further details of the consumption of individual fuels in each of the consuming sectors are provided in Tables E and F. These results are discussed in detail at Annex II.

TABLE 3

UK FINAL ENERGY DEMAND PROJECTIONS

bn therms

Higher world energy prices	GDP growth rate % pa	1980 actual	1990	2000	2010	Average annual growth 1980-2010 % pa
Case X	2.5	54.8	59.2	63.8	71.4	0.88
YU	1.5		56.7	59.3	62.8	0.45
YL	1.5		55.7	57.0	59.4	0.27
Z	0.5		53.9	51.5	51.4	-0.21
Lower World energy prices						
Case A	2.5	54.8	61.7	69.5	76.8	1.13
BU	1.5		59.3	62.5	65.9	0.61
BL	1.5		58.3	60.3	62.3	0.43
C	0.5		56.7	56.1	55.3	0.03

Effects of Rising Real Energy Prices on Energy Demand.

31. An assessment has been made of the effects of rising real energy prices in the projections of final energy demand, excluding uses in transport. The energy demands for these final consumers have been recalculated using the real energy price of 1980 throughout the projection period but maintaining all the other assumptions. The resulting energy demand levels from this calculation are all higher than in the projections. The following table provides the percentage reduction in total useful energy below these calculated levels produced by the higher real energy prices in the projections.

Final Energy Demand Excluding Transport Uses
Percentage Savings in Total Useful Energy From
Rising Real Energy Prices

Case	1990	2000	2010
X	13	24	29
YU	10	20	25
YL	10	21	25
Z	9	19	23
A	9	17	23
BU	6	15	20
BL	6	15	21
C	3	8	15

32. The figures in this table may be compared with the comparable figure of 20% for the year 2000 used as an assumption in Energy Projections 1979 rather than derived by calculation. The figures for 2000 in Cases X, YU, YL and Z are very close to 20%.

33. A similar form of calculation, which estimates what energy demand would have been for these consuming sectors in 1980 had energy prices remained constant at their 1973 levels, yields a reduction of 5.9% in these energy demands as a result of rising real energy prices over the period 1973-1980. On an annual basis this represents an average saving of 0.82% pa which is lower than the rate of 0.92% pa for a 20% saving over the period 1980-2000. Since, in the domestic sector, many of the more cost-effective energy conservation measures such as tank lagging and roof insulation in owner-occupied houses have already been taken up, the projections represent a significant challenge for energy saving in the future. However in the industrial sector many potential energy saving opportunities are held up because of the present business uncertainty.

Primary Energy Demand

34. Table 4 provides projections of total UK primary demand for energy including non-energy uses. This measure of energy demand takes account both of final energy consumption and of energy use and losses in production and distribution within the energy industries.

35. As for total final energy demand the average projected growth rates of total primary energy demand over the projection period for each of the cases fall within the range of historical experience set out in Table 2.

36. Figure 1 provides a diagrammatic display of the projected range of primary energy demands together with a comparison with Energy Projections 1979. The spread of possible primary energy demand is very wide in the year 2010 reflecting fundamental uncertainty about the future path of the economy and of fuel prices. This range is wider than that given in Energy Projections 1979, mainly because of the much wider spread of GDP growth rates assumed, as indicated in Figure 1. Allowing for differences in methodology, in the many assumptions underlying the two projection exercices and in the timing and level of the base point, the 2.5% p.a. GDP growth Case A lies between the 2% and 3% p.a. GDP growth cases for the year 2000 in Energy Projections 1979 and the higher energy price Case X lies just below the EP79 range.

37. The long-term nature of the energy projections implies not only the timescale of the projection period but also the absence of any attempt to project the effect of economic cycles on energy demands and supplies. For this reason the dotted lines in Figure 3 are meant only as a broad indication of the development of energy demand between snapshot years. This is true also of the solid lines depicting Energy Projections 1979.

TABLE 4

UK PRIMARY ENERGY DEMAND PROJECTIONS

mtce

Higher World energy prices	GDP growth rate % pa	1980 actual	1990	2000	2010	Average annual growth 1980-2010 % pa
Case X	2.5	345	380	431	512	1.33
YU	1.5		360	388	420	0.66
YL	1.5		352	370	392	0.43
Z	0.5		339	328	327	- 0.17
Lower World energy prices						
Case A	2.5	345	396	461	549	1.57
BU	1.5		376	406	446	0.86
BL	1.5		368	389	417	0.63
C	0.5		355	350	353	0.08

38. In considering the decline in primary energy consumption over the 1970s displayed in Figure 1, it is tempting to ask whether energy demand will ever rise again and whether even Case Z looks too optimistic for the future. It is perhaps more important to ask the prior question of whether the poor economic performance and decline in industrial output over the 1970s will continue into the 1990s and beyond. If this were to happen then energy demand would indeed be projected to decline further.

39. As indicated earlier in paragraphs 31 to 33 a substantial degree of energy conservation is implied in the projections of energy demand.

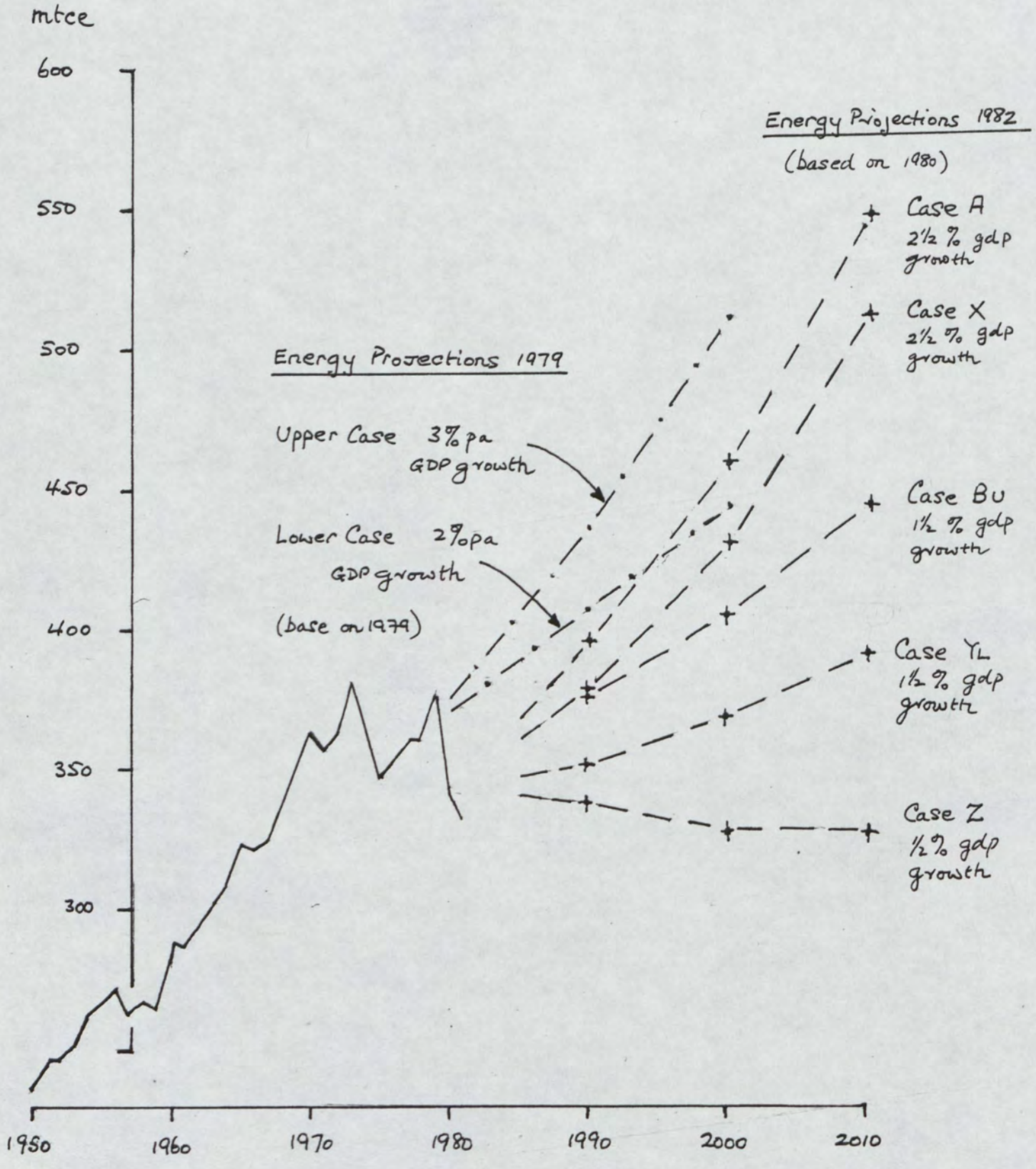
40. Details of primary energy demand for the individual fuels are given in the upper sections of Panel 4 in Tables C and D. Substantial levels of coal demand are projected in Cases A and X in 2010 with lower amounts in the other cases. Primary demand for natural gas falls towards the end of the projection period as its price rises **and UK reserves decline.**

41. Primary demand for oil is higher in 2000 and 2010 than in 1980 in Cases A, X, BU and BL and lower in Cases YU, YL, C and Z. This pattern results mainly from the combined effects of variation in the rate of growth in transport services, increasing fuel efficiency in vehicles and substitution of other fuels for oil in bulk heating.

42. There are likely to be some small direct demands for renewable energy in biofuel, solar and geothermal forms. The main uncertainties arise in the penetration rate to be expected in these energy forms and the variation of these rates with rises in real prices for conventional fuels. The projections show a growing use of these fuels (both directly and for electricity generation) to reach 21 mtce p.a. in 2010 in Case X and 17 mtce p.a. in Case A. Correspondingly lower figures are projected in other cases.

Figure 1

COMPARISON WITH ENERGY PROJECTIONS 1979
TOTAL PRIMARY ENERGY DEMAND
including non-energy uses



43. An analysis of the economics of the full-scale use of coal in the production of SNG, on the basis of the projections of energy prices, indicates that this is unlikely to occur until around 2010. This timing is extremely uncertain and will depend both on the capital and operating costs of the production process and on the evolution of coal and gas prices in the European market as a whole. Illustrative figures for coal use for SNG production have been included in all cases except Case Z in 2010. Full-scale use of coal to produce liquid fuels or feedstocks has been assumed to be uneconomic over the projection period.

V. PROSPECTS FOR ELECTRICITY SUPPLY

44. This section discusses some possible implications for electricity supply which emerge from the demand projections discussed in the previous paragraphs. It is less difficult to project overall levels of demand for electricity than to determine how that demand might be met. In addition to the economic variables, there are non-economic factors - some of which are set out in paragraph 46 below - which will influence the outcome. However, for electricity we cannot rely on international trade to build up to absorb future imbalances in domestic supply and demand. We need therefore to consider carefully what supply options are open to us and what may be economic. The detailed analysis which follows, whilst recognising the very real uncertainties, attempts to illustrate how capacity might evolve. Clearly each investment option will be analysed at the time it arises in the circumstances then current. In considering these projections for electricity supply the reader should not be misled by the apparent mathematical precision of the figures; they can only have a broad indicative value.

45. Electricity demand grew rapidly during the 1960s at an average annual rate of 6.6% pa. This rate of growth slowed during the 1970s to 1.5% pa. Table 6 gives details of UK demand for electricity over the projection period for each of the cases. As can be seen from the table the projected rates of growth are well below those experienced in the 1960s and are particularly low in Cases C and Z. In all the cases the projected rates of growth in electricity demand through the 1980s are lower than the overall rates of growth through to 2010 reflecting the similar paths assumed for growth in economic activity.

46. The capacity of generating plant required to produce this electricity supply and the new plant required in each decade are shown in Table 7, assuming a planning margin of not less than 28%. The lower section of this table provides similar information for nuclear plant. In all cases the build of nuclear plant over the period 1990-2010 has been set below the level that would have been chosen by minimising total investment and operating costs for the electricity industry (see paragraph 50 and Table 8). The projections have been prepared in this way to allow for present uncertainty over the capital and operating costs of nuclear plant and their future operating performance, possible limitations to the rate of build, social and environmental factors and possible future policy judgements on balance in fuel supply for electricity generation.

47. The second page of Table 7 provides details of the commissioning of new, non-nuclear generating plant, separated into new coal plant, peaking plant and a mixture of life extension to old coal plant, oil fired plant already under construction (5.3 GW in 1981-1990 in all cases) and, in Case A, 1.3 GW of oil plant drawn from reserve in 1981-1990. During the 1980s the only type of new plant that could now be built and commissioned would be gas turbine plant. Life extension to existing coal stations beyond the assumed normal life of 30 years is chosen on an economic basis in the electricity supply calculation at a cost of £120 per kw for an additional ten years of life. It is assumed that all coal stations from 60 MW set upwards are suitable for this purpose. This assumption may be too optimistic. If this proves to be the case then additional gas turbine plant may be required before 1990 and further base load plant after that date to compensate.

48. Once nuclear plant enters the margin of operation the projected rate of growth of electricity prices slows in real terms. In all cases this occurs after the year 2000. In the projections it has been assumed that nuclear plant will, by that time, be able to load-follow, i.e. to adapt its level of electricity output to the daily fluctuations in demand.

49. Ranges of estimates of nuclear fuel cycle costs have been prepared combining possible price paths for future uranium prices and views on likely future processing costs. The resulting profiles over the projection period are provided in Table A at the end of the paper.

TABLE 6

UK ELECTRICITY DEMAND PROJECTIONS

Twh

Higher world energy prices	GDP growth rate % pa	1980	1990	2000	2010	Average annual growth 1980 - 1990 % pa	Average annual growth 1980 - 2010 % pa
CASE X	2.5	231.1	264.8	357.8	478.1	1.4	2.5
YU	1.5		249.1	301.6	357.6	0.8	1.5
YL	1.5		243.8	285.4	326.3	0.5	1.2
Z	0.5		229.0	239.9	252.4	-0.1	0.3
Lower world energy prices							
CASE A	2.5	231.1	274.0	372.3	494.0	1.7	2.6
BU	1.5		253.9	304.6	359.1	0.9	1.5
BL	1.5		247.9	292.2	328.3	0.7	1.2
C	0.5		235.1	241.7	241.1	0.2	0.1

Table 7

UK PUBLIC ELECTRICITY SUPPLY

PROJECTION OF TOTAL AND NUCLEAR GENERATING PLANT CAPACITY AND BUILD

*

	Total capacity Gw				Total build Gw		
	1980	1990	2000	2010	1981 -1990	1991 -2000	2001 -2010
Case X	68.3	77.4	96.4	127.1	21.3	47.1	79.5
YU	68.3	74.0	83.2	95.2	17.9	34.1	60.7
YL	68.3	72.9	79.4	87.0	16.8	30.3	53.2
Z	68.3	72.2	69.0	67.1	16.2	19.9	39.7
Case A	68.3	79.5	100.0	130.8	23.5	49.8	79.6
BU	68.3	74.8	83.8	95.4	18.7	34.7	60.3
BL	68.3	73.4	80.2	87.3	17.3	31.1	53.2
C	68.3	72.2	69.3	64.1	16.2	20.2	41.1

	Nuclear capacity Gw				Nuclear build Gw		
Case X	5.8	10.8	28.0	65.5	5.6	20.5	42.6
YU	5.8	10.8	22.6	48.5	5.6	15.0	31.0
YL	5.8	10.8	22.6	47.2	5.6	15.0	29.7
Z	5.8	10.8	17.6	31.7	5.6	10.0	19.2
Case A	5.8	10.8	28.5	65.9	5.6	20.9	42.5
BU	5.8	10.8	22.6	48.5	5.6	15.0	31.0
BL	5.8	10.8	22.6	47.3	5.6	15.0	29.8
C	5.8	10.8	12.7	26.4	5.6	5.2	18.8

* including life extensions to existing coal plant.

Table 7 Continued

UK PUBLIC ELECTRICITY SUPPLY

PROJECTIONS OF NEW NON-NUCLEAR GENERATING PLANT

		New Coal plant (including coal fired CHP plant) GW			New Peaking plant (including gas turbine, pumped storage and Channel link) GW		
		1981 -1990	1991 -2000	2001 -2010	1981 -1990	1991 -2000	2001 -2010
Case	X	2.1[1]	6.7	16.0	3.4[2]	4.7	6.4
	YU	2.1	0.5	11.3	3.2	3.4	3.8
	YL	2.1	0.5	5.4	3.2	2.7	3.5
	Z	2.1	0.5	2.3	3.2	1.3	3.6
Case	A	2.1	8.4	17.0	4.3	5.1	5.5
	BU	2.1	0.6	11.3	3.2	3.8	3.4
	BL	2.1	0.5	5.6	3.2	3.0	3.3
	C	2.1	0.5	4.6	3.2	1.7	3.1

Life extension to old coal plant, oil fired plant under construction and conversion of oil plant to coal firing GW.

		1981 -1990	1991 -2000	2001 -2010
Case	X	10.2	15.3	14.6
	YU	7.0	15.2	14.6
	YL	5.9	12.1	14.6
	Z	5.3	8.1	14.6
Case	A	11.5	15.3	14.6
	BU	7.9	15.3	14.6
	BL	6.5	12.6	14.6
	C	5.3	12.8	14.6

1. Includes 1.9 GW of Drax and 0.2 GW of CCHP.
2. Includes the Channel Link, the Dinorwic pumped storage system and some gas turbine plant already under construction.

TABLE 8

UK PUBLIC ELECTRICITY SUPPLY

Estimates of Nuclear Capacity and Build on Cost Grounds Alone after 2000

	Nuclear Capacity Gw		Nuclear Build Gw	
	2000	2010	1990 -2000	2001 -2010
Case X	28.0	106.2	20.5	83.3
YU	22.6	75.0	15.0	57.5
YL	22.6	66.5	15.0	49.0
Z	17.6	44.8	10.0	32.3
Case A	28.5	89.1	20.9	65.7
BU	22.6	61.3	15.0	43.8
BL	21.0	53.2	13.4	37.3
C	7.8	31.7	0.2	29.0

TABLE 9

ASSUMPTIONS FOR CAPITAL AND NON-FUEL OPERATING COSTS AND PERFORMANCE OF NEW GENERATING PLANT.

1980 prices

	Coal	Oil	Gas turbine	Coal CHP	Nuclear
Capital Cost £/Kw					
Main plant	510	460	225	590	1000
Interest during Construction	140	120	25	100	265
Transmission	60	60	40	60	70
Initial fuel cost					60
Decommissioning Cost					30
R & D					25
Total Capital Cost	710[1]	640[1]	290	750[1]	1450[2]
Fixed operating costs £/Kw p.a.	9.63	9.63	6.09	9.63	12.14
Non-fuel variables Operating costs incl. fuel handling p/Kwh	0.125	0.125	0.355	0.125	0.185
Thermal efficiency % (in use)	36	30	25	31½*	(36)[3]
Average availability %	72	72	80	72	65

* The thermal efficiency quoted is that of electricity production alone. When the plant is producing heat the thermal efficiency is taken as 86%, 37% of this energy being taken in the form of electricity.

1 Increases at ½% p.a. between 1980-2000 and constant thereafter

2 Increases at 1% p.a. between 1980-2000 and constant thereafter

All plant assumed to take 8 years to build except gas turbine which is assumed to be built in 5 years.

3 Nominal figure only for expressing nuclear fuel costs in p/therm.

50. Table 8 provides estimates of the capacity and build of nuclear generating plant on cost grounds alone in the decade 2000/2010. These calculations have been made on the basis of assumptions for the capital and generating costs and performance characteristics for new generating plant set out in Table 9. The less costly nuclear generating stations prove to be, provided they are safe and reliable, the larger part they are likely to play in future electricity supply. Substantial quantities of nuclear generation are calculated to be economic at the costings in Table 9.

51. Details of fuel use in power stations are provided in panel 3 of Tables C and D. In cases A and X coal demand increases to 2000 and then declines as nuclear displaces coal. In the remaining cases the use of coal declines over the projection period.

Other Contributions to electricity supply:

Combined Heat and Power
and Renewable Sources.

52. The principal source of heat for district heating schemes has been assumed to be coal fired electricity generating plant which can produce both heat and electric power. The assumed profile of heat production from this source is in line with the Marshall Report on Combined Heat and Power [ ]. A number of lead city schemes are currently under consideration by consultants on behalf of the Department and the projections include a possible scheme of 200 MW electricity generating capacity by 1990, building up to a possible 2 GW capacity by 2010 producing some 300 therms of district heat p.a. The electricity produced is taken into account in the balance of supply and demand for electricity in each projection.

53. A combination of geothermal and wind power is likely to contribute to the production of electricity in situations where investment in nuclear generating plant is not developed to levels based on expected cost grounds alone. As noted in paragraph 45 nuclear build in generating plant has been set, in all the projection cases, below the level indicated on cost grounds alone and in consequence renewable energy sources are projected to contribute to power station fuelling 8 mtce pa in 2010 in Case X and 7 mtce pa in Case A. Lower figures are projected in other cases. Details are provided in tables C and D at the end of the paper. Use of the Severn Barrage for electricity production has been excluded from the projections as further decisions have yet to be made. Its inclusion would involve a saving of some 5 mtce pa of coal and possibly nuclear fuel in power station fuelling; there would also be a saving of up to 1 GW in the requirement for generating capacity.

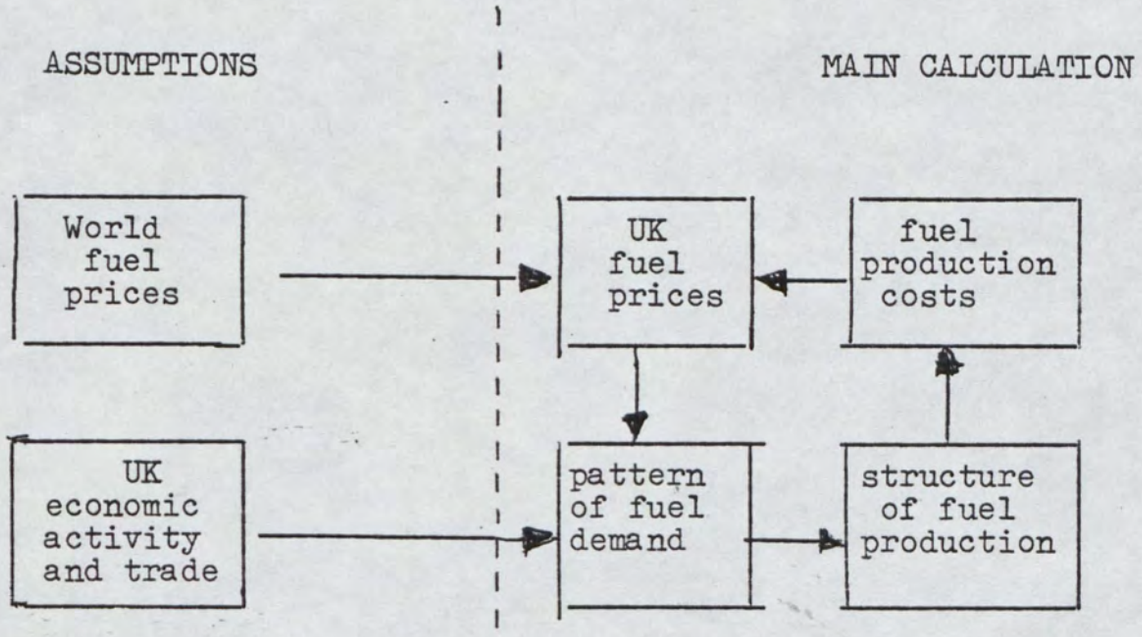
PROJECTION METHOD

1. This Annex provides a description of the projection method employed as indicated in section II of the paper. A more detailed description may be found in [ ].

2. Figure 1 illustrates the main outline of the calculation. In a given year fuel demands in each sector of the economy are determined principally by UK fuel prices and levels of economic activity. These demands, together with the pattern of trade, provide the structure of fuel production which give rise to costs of production for each fuel. UK fuel prices are influenced partly by production costs at home and partly by world fuel prices.

Figure 1

METHOD OF THE PREPARATION OF ENERGY PROJECTIONS



For tradable fuels, for example, oil or coal, domestic prices are likely to be influenced strongly by world price levels. In such cases domestic production costs together with either taxes or grants affect the level of domestic production.

Energy Demand

3. The pattern of fuel demands in the main energy consuming sectors have been analysed over the period 1954-1979 and relationships established which relate the demands by each sector for each main fuel to levels of economic activity for the sector and both current and past fuel prices. Variations in annual temperature have been allowed for in this work. These relationships are described in detail in [ ].

4. Energy demands in transport are treated separately for road, rail, air and ships bunkers. Demand for road transport is based on the Department of Transport models used to prepare National Road Traffic Forecasts as described in [ ]. These forecasts are based on assumptions for GDP growth and fuel prices and provide estimates of vehicle kilometers per annum separately for cars, public service vehicles, light vans and heavy freight vehicles. Assumptions made on saturation levels for vehicle ownership, fuel efficiency and on fuel mix provide estimates of fuel use in road transport.

5. Advice is taken from the Department of Transport on future rail electrification, growth in rail freight activity and improvements in fuel efficiency. For air transport fuel projections are based on advice from the Department of Trade on forecasts of passenger traffic which are combined with estimates of average journey lengths and efficiency in fuel use.

Energy Supply

6. Detailed calculations are made for the electricity supply industry in England and Wales which chooses the operation and investment

plans for different generating plant types in order to minimise the present value of the future capital and operating costs of the generating system required to meet the estimated electricity demands arising from the demand calculation. The costs of producing electricity from marginal operating plant are used to prepare electricity prices for each consuming sector.

7. The prices of coal and petroleum products in the UK are related in the projections to assumed future paths for coal and crude oil prices in international trade. The price of gas landed in Britain is assumed to move broadly in line with assumed future gas prices in European markets and that these will be related to prices of competing oil products.

8. Alternative projections of energy demand and of the supply patterns for electricity (for which international trade is insufficient to determine UK prices) are prepared on the basis of these prices and the economic assumptions.

9. Individual investment possibilities for coal, oil and gas industries in the UK are assessed, as they arise, inter alia on the basis of the energy projections and circumstances available at the time the assessments are made.

10. For new forms of energy supply, such as biofuels, geothermal, solar, wind etc. estimates are made (i) of the date at which the new energy forms first became economic, (ii) of the potential level of competitive supply at the assumed future prices of other fuels and (iii) the likely rate of penetration of the new energy form. Judgement is required in assessing each of these factors. Estimates are also made of the likely customers of these energy forms and of the conventional fuels displaced. The contributions of the new fuels are not necessarily additive, especially for those used in electricity generation, as the adoption of one form such as tidal reduces the potential of other renewables eg wind power.

The Calculation

11. The calculation outlined in Figure 1 is made for each of a number of snapshot years in the future. These calculations are linked through time both by the lagged effect of prices on fuel demands and by the cost minimisation calculation for electricity supply.

12. The results of this form of calculation provide details of fuel consumption by each consuming sector and the pattern of electricity production. Alternative projections are prepared by varying the many assumptions underlying the calculations.

PROSPECTS FOR ENERGY DEMAND

SECTORAL ANALYSIS

1. Projections for energy demand by final consuming sectors are given in Tables E and F and are described below for each of the principal final consuming sectors; domestic, iron and steel, other industry, transport and other consumers. The last category consists of agriculture, public and private services. A further section provides details on non-energy uses of fuels.

2. The methodology used in all sectors, except transport and non-energy uses, is to project total useful energy demand (i.e. energy demand adjusted for efficiency in end use) for each sector, related to assumptions for future economic activity and real energy prices. Total useful energy demand is then allocated between fuels on the basis of their future real price movements, and, additionally in the case of electricity, of economic growth. In addition, technological information is used to derive the fuel allocation in the iron and steel sector. The projected useful energy demands in total and for individual fuels are then adjusted, using efficiency factors, to derive the heat supplied figures given in Tables E and F. Adjustments are also made to fuel allocation to allow for the impact of CHP, renewables and biofuels.

3. In the transport sector the economic basis for the energy demand estimates is supplemented by technological information provided by the Department of Transport.

Domestic Sector

4. No increase is projected for total delivered energy between 1980 and 1990 in case X. In cases Y and Z demand is expected to fall slightly, although in the lower fossil fuel price cases, small increases are projected in cases A, BU and BL. Between 1990 and 2010 an increase of 29% is projected in case A. At the lower end of the range in case Z, the projection is for a decline of 7%. Although these figures illustrate the importance of real income as a determinant of domestic energy demand, the effect on increased comfort levels and hence energy demand is offset by increases in real fuel prices stimulating the take-up of energy conservation measures within the space and water heating sector.

5. Despite large real increases in price, gas is expected to increase its market share in all projections in the decade to 1990 as consumers continue to move to gas from other fuels for space and water heating purposes. Between 1990 and 2010 as gas becomes relatively more expensive, this share is likely to decline, except in case C, as consumers tend to move to electricity for space heating purposes. Nevertheless by 2010 the share of gas in this sector in no case is below 57% compared with a 1980 figure of 53%. Solid fuel demand, declines to 1990 but its demand remains stable thereafter. Although fossil fuel demands in 2010 are generally higher in the lower price cases, an exception is solid fuel in case C where the high coal price ratio to gas price prevents any substitution towards solid fuel.

6. The range of growth of electricity demand to 2010 is large and although some substitution of electricity for gas is projected after 2000, the figures reflect a large range of increases in demand for electricity specific uses which are dependent on real income growth. Electricity demand is less influenced by fuel price changes than fossil fuels and there is little difference between "higher price" and "lower price" cases.

7. Although renewables (solar and geothermal), biofuels and CHP do not make a significant impact until the next century, by 2010 they are estimated to account in total, for some 4-6% of this sector's use of energy, thereby displacing some gas and solid fuel.

Iron and Steel

8. Total energy demand is determined partly by the production level of this sector. In the most optimistic growth case X, both ferrous metal production and energy demands in 2010 are well below their 1970 levels. In cases YL and Z the assumed decline in ferrous metal production is reflected in falls of 31% and 35% respectively in energy demands from 1980 to 2010. There are no significant differences between higher and lower fossil fuel price cases.

9. Solid fuel is expected to increase its share in all cases displacing oil and gas; market shares of 80-84% in 2010 are projected compared with a 1980 figures of 50%. In no case is solid fuel expected to regain its consumption levels of 1970 however. Gas and Oil demands decline in all cases and by 2010 their combined usage is very small. There are only small differences between higher and lower fossil price cases.

10. There is no significant difference in electricity consumption between higher and lower fossil fuel price cases. Demand is expected to increase in those cases where ferrous metal production increases and conversely decline when there is a decrease. In no case is electricity demand expected to exceed 0.5 bn therms or 12% of sectoral energy demand.

Other Industry

11. Between 1980 and 1990 industrial energy demands are expected to increase slightly, except in case Z where the very low growth rate assumed for manufacturing production is not sufficient to outweigh the influence of increased fuel prices which stimulate energy saving. Between 1990 and 2010, in all cases except C and Z where declines are projected, the growth rate in energy demand is higher due to an increased rate of growth of manufacturing output and to less rapid increases in real fuel prices. Although in Case Z energy demand in 2010 is still below its 1980 level, in case A it is almost 50% above.

12. An important feature is that solid fuel is expected to increase its market share in all cases by displacing oil and gas; in case Z it achieves its highest penetration of 45% in 2010 because of a very low ratio of the coal to fuel oil price. In the lower price cases A, BU, BL and C demands for gas and oil are higher than the corresponding 'higher price' cases. However for solid fuels, only in case A do lower solid fuel prices lead to higher demands than in case X. In case X, the highest fossil fuel price case, coal prices are assumed to accelerate faster than oil prices in the face of excess world demand leading to a rise in the coal/fuel oil price ratio. This effect produces the relatively low solid fuel consumption figure for case X. Given the high rate of economic and industrial growth assumed in this case, this solid fuel consumption figure may be too pessimistic. Further development of projection techniques for energy demand for this sector may throw further light on the interaction between growth in industrial output, movements in fuel prices and the rate of fuel substitution.

13. The very large range of increases in electricity demands is attributable to the large range of manufacturing growth assumptions between low and high growth cases. Though much of electricity use is specific to that fuel, such as motive power, the relatively low rate of growth of real electricity price implies some substitution to electricity from other fuels.

14. CHP demand is likely to be small for this sector and no renewables are included. However, the potential for the use of biofuels to displace solid fuel and gas is large, particularly in the higher fossil fuel price cases; penetration into delivered energy in case X is as high as 9%.

Other Consumers

15. Agriculture is a small consumer of energy within this sector. The main use of energy of this sector as a whole is in the form of space and water heating and lighting for employees and customers. Energy demand is projected by relating it to indicators of employment, economic growth and real energy prices. In the higher fossil fuel cases X, YU, YL and Z energy demand is projected to increase by 19% in case X between 1980 and 2010 and decline by 15% in case Z. Although substantial increases in activity and employment are assumed, the effect of real price increases in stimulating energy conservation could be large. In the lower fossil fuel price cases A, BU, BL and C conservation is more modest and energy demands are expected to increase by as much as 33% in case A.

16. Gas is expected to increase its share and quantity between 1980 and 2000 in all cases and thereafter remain stable. By 2010 its projected market share ranges between 25% in case X and 35% in case C. Oil demands decline over this period to well below current levels. No increase in the market share of solid fuel is expected except in case Z.

17. In common with other sectors, the range of growth of electricity demand to 2010 is large, reflecting primarily the wide range of assumptions on growth of economic activity and employment within this sector. Nevertheless, because electricity increases less rapidly in price than other fuels, some substitution into electricity for space and water heating purposes may occur.

18. Although CHP is only expected to contribute 0.1bn therms to total demand, biofuels and renewables in total could account for as much as 7% of delivered energy in this sector by 2010. However, in the case of lower fossil fuel prices, this penetration is expected to be lower.

Transport

19. Energy demand in the transport sector is derived from separate analyses of the requirements for road, rail, air and water transport. For cases A, B, X and Y the sector shows steady growth in energy demand over the period to 2010. However in both cases, C and Z, demand reaches a plateau of around 15 billion therms in 1990 and there is little projected change in demand through the period to 2010.

20. The principal component of fuel use in road transport is motor spirit consumption by cars. Motor spirit price assumptions are presented in Table A. The underlying tax assumptions are that the present two-tier tax structure will remain in force with VAT continuing at 15 percent, and motor spirit duty remain constant in real terms (as opposed to remaining a constant proportion of the untaxed price). Projections are obtained by combining car traffic forecasts using the Department of Transport model together with assumptions about the future development of fuel efficiency in cars. The latter has been assumed to improve from its present level of about 30 mpg to 40 mpg in 2000 and 45 mpg in 2010. Whilst the present use of derv in cars is negligible, by 2000 its use is assumed to increase to 8% and by 2010 to 11%. No allowance has been made in the projections for the possible impact of electrically driven vehicles.

21. Projections of fuel use for air transport are based on projections of terminal passengers at UK airports prepared by the Department of Trade in conjunction with a saturation level for the more distant future of 180 million terminal passegers. Demand for aviation fuel is derived from estimates of terminal passengers, average distance travelled and plane size.

22. Rail transport is split between passenger and freight traffic. Projections of passenger traffic are based on the projection included in the Review of Main Line Electrification prepared jointly by the British Rail Board and the Department of Transport. The proportion of traffic electrically hauled is in line with Option III (slow) in the Review. 75% of passenger traffic and 54% of freight traffic is assumed to be electrically hauled by 2005 with no increase thereafter. The rest is assumed to be hauled by diesel locomotives. The fuel efficiency of diesel and electric trains has been static in recent years. No improvement in diesel or electricity used per kilometre is incorporated in these projections.

Non-Energy Uses and Bunkers

23. The largest non-energy use for oil and gas is as a feedstock for petrochemical plants. The world demand for chemicals is expected to grow rapidly over the next twenty years. Although continuing improvements in efficiency are likely, the use of feedstocks is also expected to show a rapid growth. The chemical industry operates in a highly competitive international market, expansion in world activity may be concentrated where there is access to cheap feedstocks (e.g. in the Middle East), so there is considerable uncertainty about the future for the UK industry. The projections show a strong growth in oil feedstocks - naphtha and natural gas liquids - but a decline in gas.

24. The other non-energy uses (lubricating oil, bitumen, etc) are projected to show little change from the 1980 level.

25. Much of the oil used as bunker fuel is for tankers carrying imported crude oil, so this use is expected to grow after the peak in North Sea production is passed.

CONFIDENTIAL

DRAFT 22 SEPTEMBER 1982

ENERGY PROJECTIONS

1982

TABLES A-F

CONFIDENTIAL

UK ENERGY PRICE PROJECTIONS

TABLE A

Higher Fossil Fuel Price Assumptions

Price indices 1980 = 100 (unless otherwise indicated)
Price level - p/therm unless otherwise indicated.

	1980 level	index	1990 X	1990 YU	1990 YL	1990 Z	2000 X	2000 YU	2000 YL	2000 Z	2010 X	2010 YU	2010 YL	2010 Z
DOMESTIC														
Gas	22.5	100	194	185	185	180	357	293	293	269	440	363	363	338
Oil	39.0	100	155	141	141	118	264	214	214	196	318	260	260	242
Coal	23.5	100	151	131	131	120	235	186	186	158	281	217	217	185
Electricity (average)[1 7]	4.41 p/Kwh	100	130	110	111	103	162	138	138	126	184	155	154	146
electricity (marginal)[1 2]	2.60 p/Kwh	100	149	115	118	104	198	157	157	137	230	181	180	164
INDUSTRY														
Gas 3	17.6	100	192	174	174	146	340	274	274	250	479	390	390	361
Fuel Oil	22.5	100	176	160	160	131	309	249	249	227	376	304	304	280
Gas Oil	35.0	100	154	140	140	119	266	217	217	199	320	263	263	246
Coal 3	13.4	100	167	137	137	122	287	212	212	175	331	242	242	204
Coal 4	14.6													
Electricity 1	2.37 p/Kwh	100	163	127	129	114	218	173	173	151	252	198	197	183
POWER STATIONS														
Coal 5	14.3	100	163	135	135	121	275	205	205	170	317	233	233	198
Fuel Oil	22.0	100	177	161	161	132	314	252	252	230	382	309	309	284
Nuclear Fuel	4.0	100	159	131	131	105	211	159	159	119	264	185	185	131
PRIVATE SERVICES														
Gas	24.3	100	162	154	154	149	314	255	255	233	391	319	319	296
Oil	36.0	100	153	139	139	118	261	214	214	196	314	258	258	242
Solid Fuel	36.6	100	143	128	128	119	210	174	174	150	256	206	206	175
Electricity 1	3.64 p/Kwh	100	139	115	117	107	177	148	148	134	202	167	166	157
PUBLIC SERVICES														
Gas	24.3	100	162	154	154	149	314	255	255	233	391	319	319	296
Oil	36.0	100	153	139	139	118	261	214	214	196	314	258	258	242
Coal	16.3	100	155	131	131	118	253	192	192	161	290	217	217	186
Electricity 1	3.39 p/Kwh	100	142	116	118	107	182	150	150	135	208	170	169	159
RAILWAYS														
Diesel Oil	35.0	100	154	140	140	119	266	217	217	199	320	263	263	246
Electricity 1	2.68 p/Kwh	100	150	118	120	107	199	159	159	140	230	182	181	168
ROAD TRANSPORT														
Motor Spirit	129 p/gall	100	178	170	170	156	248	218	218	207	283	247	247	237
INTERNATIONAL CRUDE OIL PRICE[6]	30.8 $/bl		51	44	44	34	88	65	65	55	107	79	79	67

1. Calculated for each projection. All other prices are assumptions.
2. For domestic customers between 750 and 7500 Kwh consumptions p.a.
3. Average price for large industrial consumer.
4. Typical price for an industrial consumer.
5. Estimate of price for new contracts.
6. (1980) $ per bbl in all years, expressed in terms of an international basket of currencies denominated in US $.
7. For domestic customers between 0 and 2500 Kwh consumption p.a.

UK ENERGY PRICE PROJECTIONS

TABLE A (Continued)

Lower Fossil Fuel Price Assumptions

Price indices 1980 = 100 (unless otherwise indicated)
Price level - p/therm unless otherwise indicated.

	1980 level	index	1990 A	1990 BU	1990 BL	1990 C	2000 A	2000 BU	2000 BL	2000 C	2010 A	2010 BU	2010 BL	2010 C
DOMESTIC														
Gas	22.5	100	169	165	165	149	236	211	211	155	322	275	275	195
Oil	39.0	100	123	99	99	82	177	158	158	114	237	203	203	144
Coal	23.5	100	123	111	111	99	164	150	150	124	209	176	176	145
Electricity (average)[1,7]	4.41 p/Kwh	100	111	100	100	92	131	127	120	109	153	140	140	140
electricity (marginal)[1,2]	2.60 p/Kwh	100	118	99	99	86	146	139	127	109	178	156	155	155
INDUSTRY														
Gas 3	17.6	100	148	118	118	95	215	190	190	132	343	289	289	249
Fuel Oil	22.5	100	129	100	100	80	191	169	169	116	262	220	220	149
Gas Oil	35.0	100	121	99	99	80	180	160	160	117	240	206	206	146
Coal 3	13.4	100	122	107	107	93	175	160	160	130	227	190	190	160
Coal 4	14.6													
Electricity 1	2.37 p/Kwh	100	130	109	109	94	160	153	139	119	196	171	170	170
POWER STATIONS														
Coal 5	14.3	100	121	107	107	93	170	156	156	128	219	184	184	156
Fuel Oil	22.0	100	130	100	100	80	193	170	170	116	266	223	223	150
Nuclear Fuel	4.0	100	159	131	131	105	211	159	159	119	264	185	185	131
PRIVATE SERVICES														
Gas	24.3	100	140	136	136	121	202	179	179	127	282	238	238	164
Oil	36.0	100	121	99	99	81	178	158	158	117	236	203	203	144
Solid Fuel	36.6	100	122	113	113	102	159	144	144	121	199	169	169	138
Electricity 1	3.64 p/Kwh	100	117	104	104	94	140	135	126	113	165	150	149	149
PUBLIC SERVICES														
Gas	24.3	100	140	136	136	121	202	179	179	127	282	238	238	164
Oil	36.0	100	121	99	99	81	178	158	158	117	236	203	203	144
Coal	16.3	100	118	106	106	94	161	149	149	125	204	174	174	149
Electricity 1	3.39 p/Kwh	100	118	104	104	93	141	136	127	113	168	151	151	151
RAILWAYS														
Diesel Oil	35.0	100	121	99	99	80	180	160	160	117	240	206	206	146
Electricity 1	2.68 p/Kwh	100	121	102	102	89	148	141	129	112	180	151	158	157
ROAD TRANSPORT														
Motor Spirit	129 p/gall	100	122	111	111	102	150	142	142	121	180	164	164	136
INTERNATIONAL CRUDE OIL PRICE[6]	30.8 $/bl		36	27	27	20	52	43	43	27	74	55	55	33

1. Calculated for each projection.. All other prices are assumptions.
2. For domestic customers between 750 and 7500 Kwh consumptions p.a.
3. Average price for large industrial consumer.
4. Typical price for an industrial consumer.
5. Estimate of price for new contracts.
6. (1980) $ per bbl in all years, expressed in terms of an international basket of currencies denominated in US $.
7. For domestic customers between 0 and 2500 Kwh consumption p.a.

UK ENERGY PROJECTIONS

TABLE B

ECONOMIC ASSUMPTIONS

indices 1975 = 100 unless otherwise indicated.

	1980	1990				2000				2010			
		X A	YU BU	YL BL	Z C	X A	YU BU	YL BL	Z C	X A	YU BU	YL BL	Z C
GDP (output at factor cost)index	107.2	134	121	121	111	176	146	146	120	225	170	170	129
Real personal disposable income index	114.9	134	125	125	118	176	151	151	127	226	175	175	137
Cases													
Real exchange rate (X YU YL Z)	2.33	2.10	2.02	2.02	1.94	2.00	1.87	1.87	1.75	2.00	1.84	1.84	1.69
$/£(1980 prices) (A BU BL C)	2.33	1.98	1.90	1.90	1.85	1.87	1.75	1.75	1.63	1.90	1.69	1.69	1.53
UK population (million)	56.0	57.0	57.0	57.0	57.0	58.3	58.3	58.3	58.3	58.8	58.8	58.8	58.8
Persons per household (Nos.)	2.58	2.52	2.52	2.52	2.52	2.52	2.52	2.52	2.52	2.52	2.52	2.52	2.52
Agriculture, forestry and fishing output index	120.5	157	140	133	124	218	175	155	132	293	209	174	140
Industrial output indices													
Iron and Steel mlh 311-313	67.1	88	82	68	65	106	94	62	56	126	104	56	50
Chemical and Allied mlh 271-279	109.7	182	146	129	115	336	222	164	127	587	312	199	140
Building materials mlh 461-469	90.6	118	105	100	93	164	131	116	99	220	157	131	105
Other manufacturing mlh 211-240, 321-450, 471-499	95.6	122	109	106	99	161	132	122	106	204	154	138	112
Total manufacturing	95.1	124	110	105	98	172	138	122	104	231	165	137	110
Service sector indices													
Distributive trades output index	106.1	141	122	120	110	198	154	145	119	271	185	168	128
Miscellaneous services output index	116.4	133	125	132	121	158	140	159	130	184	153	184	140
Private, financial, professional and scientific services employment index	111.5	136	129	126	116	174	162	150	126	217	193	173	137
Public services employment index	101.2	113	108	112	106	129	118	130	113	146	127	146	122

UK ENERGY PROJECTIONS
Higher Fossil Fuel Price Assumptions
UK Final Energy Demand by Sector

TABLE C

bn therms

	1960	1970	1980	1990				2000				2010			
				X	YU	YL	Z	X	YU	YL	Z	X	YU	YL	Z
Domestic	14.4	14.6	15.8	16.0	15.4	15.4	14.8	17.0	15.7	15.7	13.9	19.6	16.8	16.7	13.8
Iron and Steel	7.1	7.2	2.9	3.6	3.4	2.9	2.8	3.8	3.5	2.4	2.2	4.1	3.5	2.0	1.9
Other Industry	14.3	17.3	14.6	15.8	15.3	14.8	14.5	17.4	16.3	15.1	14.2	19.9	17.5	15.7	14.4
Transport	8.8	11.2	14.1	16.4	15.4	15.4	14.8	17.9	16.6	16.6	14.8	19.0	17.3	17.3	15.1
Other Consumers	5.9	7.4	7.5	7.3	7.1	7.1	6.9	7.8	7.2	7.2	6.5	8.9	7.7	7.6	6.4
TOTAL	50.5	57.7	54.8	59.2	56.7	55.7	53.9	63.8	59.3	57.0	51.5	71.4	62.8	59.4	51.4

UK FINAL ENERGY DEMAND BY FUEL

bn therms

	1960	1970	1980	1990				2000				2010			
				X	YU	YL	Z	X	YU	YL	Z	X	YU	YL	Z
Solid Fuel	32.1	18.5	7.5	8.1	8.8	8.3	7.7	8.6	10.1	8.9	8.9	9.5	11.1	9.3	10.3
Gas	2.6	5.5	14.8	17.3	16.2	16.0	15.6	16.0	14.6	14.4	12.8	15.8	13.6	13.4	11.0
Electricity	3.4	6.6	7.7	8.8.	8.3	8.1	7.6	12.0	10.1	9.5	8.0	16.1	12.0	10.9	8.4
Oil	12.4	27.2	24.8	24.7	23.3	23.0	22.9	25.7	23.3	23.0	21.0	26.3	23.2	22.8	19.5
CHP				0	0	0	0	0.1	0.1	0.1	0.1	0.4	0.4	0.4	0.4
Biofuels				0.3	0.2	0.2	0.1	1.1	0.8	0.8	0.5	2.7	2.1	2.1	1.4
Renewables				0	0	0	0	0.3	0.3	0.3	0.1	0.6	0.5	0.5	0.3
TOTAL	50.5	57.7	54.8	59.2	56.7	55.7	53.9	63.8	59.3	57.0	51.5	71.4	62.8	59.4	51.4

UK POWER STATION FUELLING

bn therms

	1960	1970	1980	1990				2000				2010			
				X	YU	YL	Z	X	YU	YL	Z	X	YU	YL	Z
Coal	53.5	77.3	89.7	90.8	82.3	79.3	72.7	92.6	81.6	74.6	63.5	62.0	48.7	38.2	37.7
Oil	9.3	21.4	11.2	6.3	5.7	5.5	5.0	10.8	7.3	5.9	4.7	3.2	2.0	1.7	1.9
Nuclear and Hydro 1	2.6	11.8	15.3	35.1	35.1	35.1	35.1	71.9	60.1	60.1	49.1	153.6	117.1	114.2	81.2
Renewables 2		0.2	0.6	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	7.9	2.4	1.9	0.3
TOTAL	65.5	110.7	116.8	132.6	123.4	120.2	113.1	175.6	149.4	141.0	117.6	226.8	170.2	156.0	121.2

UK PRIMARY ENERGY DEMAND

mtce

PRIMARY ENERGY DEMAND	1960	1970	1980	1990				2000				2010			
				X	YU	YL	Z	X	YU	YL	Z	X	YU	YL	Z
Energy Uses															
Coal	198.6	156.9	120.8	125.2	119.3	114.2	105.0	128.3	123.3	111.2	99.9	138.9	104.9	83.7	80.0
Natural Gas	0.1	17.1	64.2	74.8	70.4	69.8	67.8	69.6	63.6	62.8	56.3	43.2	52.2	53.6	48.7
Oil	68.1	150.0	121.4	117.2	109.9	108.6	107.3	128.7	113.3	109.9	99.9	124.3	108.0	105.7	91.3
Nuclear and Hydro	2.6	11.9	15.4	35.1	35.1	35.1	35.1	71.9	60.1	60.1	49.1	153.6	117.1	114.2	81.2
Biofuels				1.2	0.7	0.7	0.5	4.5	3.3	3.3	2.1	10.9	8.5	8.5	5.6
Renewables				0.1	0.1	0.1	0.1	1.1	1.0	1.0	0.6	9.9	3.9	3.4	1.4
TOTAL ENERGY USES	269.4	335.9	321.8	353.6	335.5	328.5	315.7	404.1	364.6	348.3	307.9	480.6	394.7	369.1	308.2
NON ENERGY USES															
Natural Gas		0.8	6.9	6.4	6.4	6.4	6.4	2.0	2.0	2.0	2.0	0.0	0.0	0.0	0.0
Oil (feedstock)	7.0	17.0	11.8	16.5	15.1	14.8	14.3	20.9	17.8	16.7	14.6	27.9	21.6	19.4	15.8
Oil (Bunkers)	9.4	9.4	4.2	3.1	2.7	2.7	2.9	3.7	3.6	3.4	3.2	3.9	3.7	3.7	3.2
TOTAL NON ENERGY USES	16.4	27.2	22.9	25.9	24.2	23.9	23.6	26.6	23.4	22.1	19.8	31.8	25.3	23.1	19.0
TOTAL PRIMARY ENERGY USES	285.8	363.1	344.7	379.5	359.7	352.4	339.3	430.8	388.0	370.3	327.7	512.4	420.0	392.2	327.2

1. Includes Channel Link and Pumped Storage.
2. Includes a small amount of gas.

UK ENERGY PROJECTIONS

Lower Fossil Fuel Price Assumptions

TABLE D

UK FINAL ENERGY DEMAND BY SECTOR

bn therms

	1960	1970	1980	1990				2000				2010			
				A	BU	BL	C	A	BU	BL	C	A	BU	BL	C
Domestic	14.4	14.6	15.8	16.8	16.1	16.1	15.8	19.2	17.3	17.2	16.2	21.7	18.3	18.2	16.2
Iron and Steel	7.1	7.2	2.9	3.7	3.6	3.0	2.9	4.0	3.6	2.4	2.3	4.2	3.6	2.0	1.9
Other Industry	14.3	17.3	14.6	16.7	16.2	15.7	15.5	19.1	16.9	15.8	15.2	21.6	18.1	16.2	14.8
Transport	8.8	11.2	14.1	16.6	15.8	15.8	15.0	18.4	16.9	16.9	15.1	19.4	17.6	17.6	15.3
Other Consumers	5.9	7.4	7.5	7.8	7.7	7.7	7.5	8.8	7.8	7.9	7.4	10.0	8.3	8.2	7.1
TOTAL	50.5	57.7	54.8	61.7	59.3	58.3	56.7	69.5	62.5	60.3	56.1	76.8	65.9	62.3	55.3

UK FINAL ENERGY DEMAND BY FUEL

bn therms

	1960	1970	1980	1990				2000				2010			
				A	BU	BL	C	A	BU	BL	C	A	BU	BL	C
Solid Fuel	32.1	18.5	7.5	8.4	7.8	7.4	7.1	10.1	8.5	7.4	5.8	11.8	10.1	8.4	5.4
Gas	2.6	5.5	14.8	17.8	16.6	16.5	16.3	18.4	16.6	16.4	16.5	18.2	16.1	15.8	16.0
Electricity	3.4	6.6	7.7	9.1	8.4	8.2	7.8	12.5	10.2	9.7	8.0	16.6	12.0	11.0	8.0
Oil	12.4	27.2	24.8	26.1	26.2	26.0	25.3	27.4	26.3	25.8	25.1	27.2	25.4	24.9	24.1
CHP				0	0	0	0	0.1	0.1	0.1	0.1	0.4	0.4	0.4	0.4
Biofuels				0.3	0.2	0.2	0.1	0.8	0.6	0.6	0.4	1.9	1.4	1.4	1.1
Renewables				0	0	0	0	0.3	0.2	0.2	0.2	0.6	0.5	0.5	0.3
TOTAL	50.5	57.7	54.8	61.7	59.3	58.3	56.7	69.5	62.5	60.3	56.1	76.8	65.9	62.3	55.3

UK POWER STATION FUELLING

mtce

	1960	1970	1980	1990				2000				2010			
				A	BU	BL	C	A	BU	BL	C	A	BU	BL	C
Coal	53.5	77.3	89.7	95.4	85.0	81.7	75.6	97.8	82.8	76.1	75.9	68.0	49.5	40.1	44.1
Oil	9.3	21.4	11.2	7.2	5.9	5.9	5.3	10.7	7.6	6.4	4.9	3.4	2.0	1.7	2.3
Nuclear and Hydro [1]	2.6	11.8	15.3	35.1	35.1	35.1	35.1	73.0	60.1	60.1	38.1	154.8	117.2	114.4	69.2
Renewables [2]		0.2	0.6	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	7.2	1.9	0.3	0.3
TOTAL	65.5	110.7	116.8	137.9	126.3	123.0	116.2	182.0	150.9	143.1	119.3	233.4	170.6	156.5	115.9

UK PRIMARY ENERGY DEMAND

mtce

PRIMARY ENERGY DEMAND	1960	1970	1980	1990				2000				2010			
				A	BU	BL	C	A	BU	BL	C	A	BU	BL	C
ENERGY USES															
Coal	198.6	156.9	120.8	130.9	118.0	112.7	105.8	139.7	118.0	106.5	100.0	176.0	129.0	109.3	102.3
Natural Gas	0.1	17.1	64.2	77.0	72.1	71.7	70.7	79.5	72.1	71.1	71.6	38.0	43.9	44.8	44.8
Oil	68.1	150.0	121.4	124.3	123.5	122.2	117.4	135.4	127.4	123.7	116.5	129.7	119.3	116.2	110.1
Nuclear and Hydro	2.6	11.9	15.4	35.1	35.1	35.1	35.1	73.0	60.1	60.1	38.1	154.8	117.2	114.4	69.2
Biofuels				1.0	0.7	0.7	0.5	3.1	2.3	2.3	1.8	7.7	5.5	5.5	4.2
Renewables				0.1	0.1	0.1	0.1	1.1	0.9	0.9	0.6	9.1	3.4	1.8	1.4
TOTAL ENERGY USES	269.4	335.9	321.8	368.4	349.5	342.5	329.5	431.8	380.9	364.7	328.5	515.3	418.3	392.0	331.9
NON ENERGY USES															
Natural Gas		0.8	6.9	6.4	6.4	6.4	6.4	2.0	2.0	2.0	2.0	0.0	0.0	0.0	0.0
Oil (feedstocks)	7.0	17.0	11.8	17.2	16.3	15.6	15.1	22.3	19.0	17.5	15.5	29.4	22.6	20.2	17.0
Oil (Bunkers)	9.4	9.4	4.2	3.6	3.7	3.7	3.9	4.6	4.4	4.4	4.1	4.8	4.6	4.4	4.4
TOTAL NON ENERGY USES	16.4	27.2	22.9	27.1	26.5	25.8	25.4	28.9	25.5	23.9	21.6	34.2	27.2	24.6	21.4
TOTAL PRIMARY ENERGY DEMAND	285.8	363.1	344.7	395.6	376.0	368.3	355.0	460.7	406.4	388.6	350.1	549.4	445.5	416.7	353.4

1. Includes Channel Link and pump storage.
2. Includes a small amount of gas.

UK ENERGY PROJECTIONS TABLE E

Higher Fossil Fuel Price Assumptions

UK Final Energy Demand by Sector and By Fuel

Domestic bn therms

	1960	1970	1980	1990				2000				2010			
				X	YU	YL	Z	X	YU	YL	Z	X	YU	YL	Z
Solid Fuel	11.3	7.1	3.3	1.7	1.8	1.8	1.8	1.5	1.6	1.6	1.6	1.7	1.8	1.8	1.8
Gas	1.3	3.5	8.4	10.8	10.2	10.1	9.7	10.8	9.9	9.8	8.6	11.5	9.8	9.7	7.9
Electricity	1.1	2.6	2.9	3.0	2.9	2.9	2.8	3.9	3.5	3.5	3.0	5.1	4.2	4.2	3.3
Oil	0.7	1.3	1.1	0.5	0.5	0.5	0.6	0.3	0.3	0.3	0.4	0.2	0.2	0.2	0.2
CHP				0	0	0	0	0.1	0.1	0.1	0.1	0.3	0.3	0.3	0.3
Biofuels				0	0	0	0	0.1	0.1	0.1	0.1	0.4	0.3	0.3	0.2
Renewables				0	0	0	0	0.2	0.2	0.2	0.1	0.4	0.3	0.3	0.3
TOTAL	14.4	14.6	15.8	16.0	15.4	15.4	14.8	17.0	15.7	15.7	13.9	19.6	16.8	16.7	13.8

IRON AND STEEL

	1960	1970	1980	1990				2000				2010			
				X	YU	YL	Z	X	YU	YL	Z	X	YU	YL	Z
Solid Fuel	5.7	4.2	1.4	2.5	2.4	2.0	2.0	2.9	2.7	1.8	1.7	3.4	2.9	1.6	1.5
Gas	0.1	0.2	0.5	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1
Electricity	0.2	0.4	0.3	0.4	0.4	0.3	0.3	0.5	0.4	0.3	0.3	0.5	0.4	0.2	0.2
Oil	1.0	2.3	0.7	0.4	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.0
TOTAL	7.1	7.2	2.9	3.6	3.4	2.9	2.8	3.8	3.5	2.4	2.2	4.1	3.5	2.0	1.9

OTHER INDUSTRY

	1960	1970	1980	1990				2000				2010			
				X	YU	YL	Z	X	YU	YL	Z	X	YU	YL	Z
Solid Fuel	9.1	5.3	2.2	3.5	4.1	4.0	3.4	3.9	5.3	5.0	5.0	4.1	5.9	5.4	6.4
Gas	0.7	1.0	3.9	3.4	3.1	3.0	3.2	2.5	2.2	2.1	1.9	2.0	1.7	1.6	1.3
Electricity	1.3	2.1	2.4	3.1	2.9	2.7	2.5	4.6	3.6	3.1	2.7	6.6	4.4	3.5	2.7
Oil	3.1	8.9	6.1	5.6	5.1	4.9	5.3	5.6	4.6	4.3	4.2	5.3	4.0	3.7	2.9
CHP				0	0	0	0	0	0	0	0	0.1	0.1	0.1	0.1
Biofuels				0.3	0.2	0.2	0.1	0.8	0.6	0.6	0.4	1.9	1.5	1.5	1.0
TOTAL	14.3	17.3	14.6	15.8	15.3	14.8	14.5	17.4	16.3	15.1	14.2	19.9	17.5	15.7	14.4

TRANSPORT

	1960	1970	1980	1990				2000				2010			
				X	YU	YL	Z	X	YU	YL	Z	X	YU	YL	Z
Coal	2.9	0.1	0.0	0	0	0	0	0	0	0	0	0	0	0	0
Electricity	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2
Oil	5.9	11.0	14.0	16.3	15.3	15.3	14.7	17.7	16.4	16.4	14.6	18.7	17.1	17.1	14.9
TOTAL	8.8	11.2	14.1	16.4	15.4	15.4	14.8	17.9	16.6	16.6	14.8	19.0	17.3	17.3	15.1

OTHER CONSUMERS

	1960	1970	1980	1990				2000				2010			
				X	YU	YL	Z	X	YU	YL	Z	X	YU	YL	Z
Solid Fuel	3.1	1.7	0.6	0.4	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.3	0.5	0.5	0.6
Gas	0.5	0.8	2.1	2.7	2.6	2.6	2.4	2.5	2.3	2.3	2.1	2.2	2.0	2.0	1.8
Electricity	0.6	1.4	1.9	2.2	2.0	2.0	1.8	2.8	2.4	2.4	1.9	3.7	2.8	2.8	2.0
Oil	1.7	3.6	2.9	2.0	2.0	2.0	2.2	1.9	1.8	1.8	1.8	2.0	1.8	1.7	1.5
CHP				0	0	0	0	0	0	0	0	0.1	0.1	0.1	0.1
Biofuels				0	0	0	0	0.1	0.1	0.1	0.1	0.4	0.4	0.4	0.2
Renewables				0	0	0	0	0.1	0.1	0.1	0	0.1	0.1	0.1	0.1
TOTAL	5.9	7.4	7.5	7.3	7.1	7.1	6.9	7.8	7.2	7.2	6.5	8.9	7.7	7.6	6.4

UK ENERGY PROJECTIONS

Lower Fossil Fuel Price Assumptions

UK Final Energy Demand by Sector and Fuel

TABLE F

bn therms

DOMESTIC

	1960	1970	1980	1990				2000				2010			
				A	BU	BL	C	A	BU	BL	C	A	BU	BL	C
Solid Fuel	11.3	7.1	3.3	1.9	2.0	2.0	2.0	1.8	1.8	1.8	1.6	2.0	1.9	1.8	1.5
Gas	1.3	3.5	8.4	11.1	10.2	10.2	10.0	12.5	11.2	11.1	10.9	13.3	11.3	11.2	10.9
Electricity	1.1	2.6	2.9	3.1	3.0	3.0	2.9	4.1	3.5	3.6	2.9	5.2	4.0	4.1	2.9
Oil	0.7	1.3	1.1	0.6	0.8	0.8	0.8	0.5	0.5	0.5	0.6	0.3	0.3	0.3	0.3
CHP				0	0	0	0	0.1	0.1	0.1	0.1	0.3	0.3	0.3	0.3
Biofuels				0	0	0	0	0.1	0	0	0	0.2	0.2	0.2	0.1
Renewables				0	0	0	0	0.2	0.2	0.2	0.1	0.4	0.3	0.3	0.3
TOTAL	14.4	14.6	15.8	16.8	16.1	16.1	15.8	19.2	17.3	17.2	16.2	21.7	18.3	18.2	16.2

IRON AND STEEL

	1960	1970	1980	1990				2000				2010			
				A	BU	BL	C	A	BU	BL	C	A	BU	BL	C
Solid Fuel	5.7	4.2	1.4	2.5	2.4	2.0	2.0	2.9	2.7	1.8	1.7	3.6	2.9	1.6	1.5
Gas	0.1	0.2	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1
Electricity	0.2	0.4	0.3	0.4	0.4	0.3	0.3	0.5	0.4	0.3	0.3	0.5	0.4	0.2	0.2
Oil	1.0	2.3	0.7	0.4	0.4	0.3	0.2	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1
TOTAL	7.1	7.2	2.9	3.7	3.6	3.0	2.9	4.0	3.6	2.4	2.3	4.2	3.6	2.0	1.9

OTHER INDUSTRY

	1960	1970	1980	1990				2000				2010			
				A	BU	BL	C	A	BU	BL	C	A	BU	BL	C
Solid Fuel	9.1	5.3	2.2	3.4	2.8	2.7	2.6	4.8	3.5	3.3	2.1	5.7	4.8	4.4	2.2
Gas	0.7	1.0	3.9	3.6	3.7	3.6	3.7	2.7	2.7	2.6	2.8	2.1	2.1	2.0	2.4
Electricity	1.3	2.1	2.4	3.2	2.8	2.7	2.5	4.8	3.6	3.2	2.7	6.9	4.5	3.6	2.7
Oil	3.1	8.9	6.1	6.2	6.7	6.5	6.7	6.2	6.6	6.2	7.2	5.4	5.6	5.2	6.7
CHP				0	0	0	0	0	0	0	0	0.1	0.1	0.1	0.1
Biofuels				0.2	0.2	0.2	0.1	0.6	0.5	0.5	0.3	1.4	1.0	1.0	0.8
TOTAL	14.3	17.3	14.6	16.7	16.2	15.7	15.5	19.1	16.9	15.8	15.2	21.6	18.1	16.2	14.8

TRANSPORT

	1960	1970	1980	1990				2000				2010			
				A	BU	BL	C	A	BU	BL	C	A	BU	BL	C
Coal	2.9	0.1	0.0	0	0	0	0	0	0	0	0	0	0	0	0
Electricity	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2
Oil	5.9	11.0	14.0	16.5	15.6	15.6	14.8	18.3	16.8	16.8	14.9	19.2	17.5	17.5	15.2
TOTAL	8.8	11.2	14.1	16.6	15.8	15.8	15.0	18.4	16.9	16.9	15.1	19.4	17.6	17.6	15.3

OTHER CONSUMERS

	1960	1970	1980	1990				2000				2010			
				A	BU	BL	C	A	BU	BL	C	A	BU	BL	C
Solid Fuel	3.1	1.7	0.6	0.5	0.6	0.6	0.5	0.6	0.5	0.5	0.4	0.6	0.5	0.5	0.2
Gas	0.5	0.8	2.1	2.7	2.3	2.3	2.3	2.9	2.5	2.5	2.6	2.8	2.5	2.5	2.5
Electricity	0.6	1.4	1.9	2.3	2.1	2.1	1.9	3.0	2.5	2.5	2.0	3.8	2.9	2.9	2.1
Oil	1.7	3.6	2.9	2.3	2.7	2.7	2.8	2.2	2.2	2.2	2.3	2.2	2.0	1.9	1.9
CHP				0	0	0	0	0	0	0	0	0.1	0.1	0.1	0.1
Biofuels				0	0	0	0	0.1	0.1	0.1	0.1	0.3	0.3	0.3	0.2
Renewables				0	0	0	0	0.1	0.1	0.1	0	0.1	0.1	0.1	0.1
TOTAL	5.9	7.4	7.5	7.8	7.7	7.7	7.5	8.8	7.8	7.9	7.4	10.0	8.3	8.2	7.1

SECRETARY OF STATE FOR THE ENVIRONMENT

2 MARSHAM STREET
LONDON SW1P 3EB

01-212 3434

My ref: H/PSO/15579/82

Your ref:

16 AUG 1982

SIZEWELL PWR INQUIRY: AID TO OBJECTORS

Thank you for your letter of 30 July.

I agreed that no new arguments have been advanced in favour of aid to objectors, that we should stand by our previous decision not to offer public funds for this purpose and that we must be prepared to hold that line under future pressure. We must also continue to discourage the CEGB from offering funds should they return to that option.

I have never been in any doubt that in this case pressure for aid to objectors would mount and could become intense. But like you I do not think it could be treated as unique. I believe we must rebut firmly the view that a full and fair public inquiry cannot be held without it, and we must restate the principle that where organisations and individuals make representations at inquiries it is up to them to fund the cost of putting their point of view, subject to the possibility of an award of costs against any party who has behaved unreasonably. I agree with you that in a case of this kind objectors have a fair prospect of raising funds by voluntary subscription.

I think it is right that Sir Frank's letter and your reply should be published together. If I (or my officials should I be on leave) could help in the drafting of your reply I would be grateful.

I am copying this letter to the recipients of yours.

yours ever

MICHAEL HESELTINE

The Rt Hon Nigel Lawson MP

SECRET & PERSONAL

cc J.V
NBPM
Wh
Gro 3/8

Treasury Chambers, Parliament Street, SW1P 3AG
01-233 3000

PRIME MINISTER

WATER SUPPLIES TO THE CEGB

The Secretary of State for Energy copied to me his minute of 21 July proposing that he should ask the CEGB to set action in hand to make their system less vulnerable to the effects of a dispute in the water industry. I have now seen Michael Scholar's letter of 27 July, giving your view in favour of going ahead, and that of the Secretary of State for Employment.

2. I understand that MISC 61 concluded last year that the risk of significant disruption of electricity supply as a result of lack of mains maintenance during industrial action was inherently unlikely. Theoretically the system could be paralysed by a complete shutdown of water supply or by selective action by the water workers aimed specifically at interfering with power stations. It does not follow, however, that by protecting power stations we will increase materially our ability to withstand major industrial action by the water workers. That depends on whether other key sectors are equally vulnerable. The Home Secretary's minute of 22 October 1981 suggested, for example, that lack of water for sanitation was the bigger danger.

3. I am not therefore myself wholly persuaded that the expenditure of £10m would be justified. However I do not particularly want to resist a move along these lines so long as it is on the firm understanding that the expenditure would be contained within existing investment plans and would not be an argument for increased public expenditure. This is clearly what the Energy Secretary hopes to achieve. If there were

SECRET & PERSONAL

any doubts on this score I would want a further opportunity to consider whether the expenditure should go ahead.

4. I am sending copies of this minute to the Secretaries of State for Defence, Energy, Environment, Scotland, Wales and Employment, and to Sir Robert Armstrong and Mr Sparrow.

(G.H.)
2 August 1982


3 AUG 1982

CONFIDENTIAL

cc SV

Prime Minister 2

The Secretary of State stands by his decision not to grant aid to objectors, despite the representations that have been made.

MM
2/8

01-211 6402

The Rt Hon Michael Heseltine MP
Secretary of State for the Environment
Department of the Environment
2 Marsham Street
London SW1

30th July 1982

Dear Secretary of State

MF

SIZEWELL PWR INQUIRY: AID TO OBJECTORS

I wrote to you on 26 January about aid to objectors at Sizewell. It was agreed that the balance of argument was against the Government granting aid to objectors and that the CEGB who were at that time considering providing funds should be discouraged from doing so. The Board has since decided that this is a matter for the Government though it remains broadly in favour of funding.

As expected the issue featured prominently at the pre-Inquiry meeting held by the Inspector (Sir Frank Layfield QC) at the Snape Maltings from 1-3 June. I have just received from Sir Frank a letter (copy enclosed) setting out the main arguments in favour of Government funding deployed by objectors. Sir Frank makes no recommendation but asks that the provision of financial assistance be reconsidered "because of the extent, character and importance of the representations and the extent of the considered feeling they represent". He also asks that his letter and my reply be published in due course.

The Inspector's letter adds no new arguments in favour of funding. But by its tone it is bound to be interpreted by objectors as broadly supporting their case. It therefore requires a carefully considered reply.

I have re-examined the arguments and discussed the letter with Sir Frank Layfield. I remain firmly of the view that the Government should not fund objectors. I accept that public funds should be spent in investigating the validity of the CEGB's case. This is of course the purpose of the inquiry process which, barring an elaborate boycott is itself a guarantee that objections to the proposal will be aired, albeit with less backing and skill than they might be with the benefit of funding. But to fund objectors would call into question the credibility of the whole inquiry process.

CONFIDENTIAL

To ensure a thoroughgoing inquiry I have appointed an eminent and very experienced Inspector who will be helped in his detailed scrutiny of the CEGB's case by Assessors on a number of technical aspects. I have already announced the appointment of an Assessor on the biological effects of radiation; an engineering assessor will also be appointed and I intend to accede to the Inspector's request for an economic assessor. This will provide a formidable array of expertise to assist the thorough public airing of the CEGB's proposal.

The objectors also overlook the key role played by the NII in its independent examination of the safety of the PWR. The inspectorate has to date spent some £7m on this work. Its 15 July report on the CEGB's pre-construction safety report alone cost £200,000 and its current rate of expenditure on PWR safety work is £2m a year. This public expenditure to safeguard objectors' interests is already substantial. In addition the Atomic Energy Authority is devoting a sizeable effort to PWR safety research. It will spend some £14m on this in the current year.

In my view no adequate case has been made for funding objectors to the Sizewell PWR. It would create a precedent which would inevitably be costly in terms of public expenditure, state funding would need to be generous to be effective. If the objectors' concern about the proposal is, as they suggest, shared by the wider public it should be possible for them to raise funds by voluntary subscription as indeed has been successfully done by objectors at other inquiries.

I have put these views to Sir Frank Layfield. Although I understand he is personally on balance in favour of funding objectors he believes it to be no part of his role as Inspector to express a view on the issue and he is prepared to accept the Government's decision. Moreover he takes the view that the absence of funding for objectors will not significantly affect his ability to conduct a thorough and fair inquiry and prepare a report. He attaches considerable importance however to the Government making a considered statement on the issue: my reply to his letter will provide the opportunity for this.

Nevertheless, we should recognise that there could be serious political difficulties over a decision to refuse funding. This will come not only from the objectors and the Opposition but also from some of our own backbenchers who have taken a lively interest in the issue. Any line we take now we have got to be prepared to hold.

For this reason and because I intend that Sir Frank's letter and my reply shall be published together and copied to all MPs I thought it right to bring these developments to your attention and to those of our colleagues to whom our original correspondence was copied. I would be grateful for your early views before I reply to Sir Frank.

I am sending copies of this letter to the Prime Minister, Geoffrey Howe, John Biffen, Peter Walker, George Younger, Nicholas Edwards, Arthur Cockfield, Michael Havers, Michael Jopling and Sir Robert Armstrong.

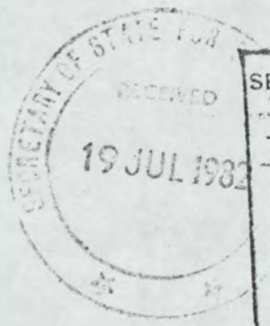
Yours sincerely

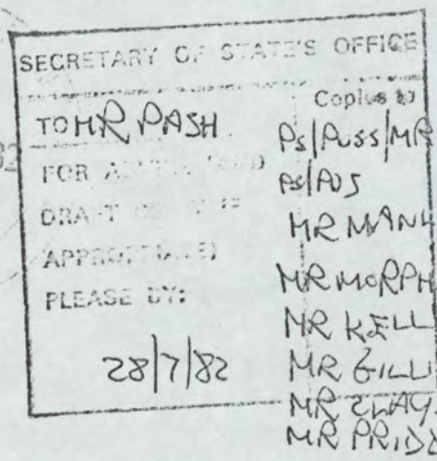
pp NIGEL LAWSON

(Approved by the Secretary of State and signed in his absence)

2, MITRE COURT BUILDINGS,
TEMPLE,
EC4Y 7BX.
TELEPHONE: 01-583 1355.

18th July, 1982.





The Rt. Hon. Nigel Lawson,
Secretary of State for Energy,
Department of Energy,
Thames House, South.Millbank,
S.W.1.P. 4Q.J.
LONDON.

Dear Secretary of State,

THE SIZEWELL INQUIRY

On the 1st June I held a preliminary meeting for the Sizewell Inquiry which lasted for three days. During the meeting the most frequent request made to me was for the provision of public funds to objectors and others who wish to appear at the Inquiry. These requests came from individuals and interested groups of many kinds and corporate bodies such as Trade Unions and local authorities. It was clear to me that these requests reflected strongly and widely held views which, in many instances, were based on thoughtful and well-considered arguments.

Many of those present at the meeting asked me to pass on their arguments to you and this I now seek to do. In doing so, I realise that requests of a similar kind have been drawn to the attention of Ministers on a number of previous occasions; the Report of Mr. Justice Parker on the Windscale Inquiry (paragraphs 15.8 & 15.9) is a prominent instance. However, the correspondence regarding Sizewell between objectors and yourself and

Page 2/..

your Ministerial colleagues has plainly left some of those objectors with the feeling that they have been unsuccessful in putting their arguments sufficiently effectively or clearly to Ministers. They complain that the Government's replies show that their requests have not been fully understood or considered.

The representations I now put before you raise questions that extend well beyond my scope and knowledge as your Inspector for the Sizewell Inquiry. I therefore make no recommendations to you about the provision of financial assistance to objectors. However, because of the extent, character and importance of the representations and the extent of considered feeling they reflect, I ask that the provision of financial assistance be reconsidered.

Those advising you will have seen the transcripts of the three-day meeting and can identify any special or particular reference for you. I attach to this letter a representative list of those who made relevant requests, with the key transcript references, should you or your advisers wish to look at the precise terms employed by those requesting assistance.

Before I summarise the principal arguments I was asked to convey to you, I draw attention to the distinction made as to the Scale of Finance help sought. The main weight of contention was addressed to the need to prepare an adequate case and its presentation at the Inquiry. Others, however, were content to seek the payment of 'expenses', meaning mainly the cost of travelling and accommodation incurred by a Party in order to attend the main hearing and its preliminary meetings. Some of

Page 3/..

those who sought preparation and presentation costs, would if refused part or all of those costs, still contend strongly for their expenses to be paid.

The two principal arguments for financial assistance can be expressed shortly. First, the subjects to be examined at the Inquiry are of great national importance, especially those of Energy Policy, and concern actions and consequences that will extend over a long span of years. Some of the subjects involved are highly complex and technical whose understanding requires much work in fields bordering on the edge of existing knowledge. Some subjects, such as risks to human health and safety, have aroused widespread public concern. The financial implications of the proposals under scrutiny are very large, wideranging and have important repercussions. These aspects taken together, it was strongly urged, mean that the Sizewell Inquiry is a unique, at at least special, case so far as the provision of public funds is concerned.

Secondly, it was stressed that the likelihood is the Inquiry will be the sole opportunity which the public will have to take part in a critical examination of the national issues involved. It was argued that, if Sizewell B is permitted, all future Inquiries into P.W.R.Stations will be concerned, wholly or mainly with siting and local environmental aspects only.

Taken together, these two propositions mean that objectors must be in a position to carry out enough work, including research work, to enable them to advance an adequately critical case at the Inquiry. The very substantial documentation being provided by the CEGB and the N I I needs

Page 4/..

to be most carefully examined and considered, often with expert assistance, fully to understand the material if a response of any value is to be made to it at the Inquiry. That, it was stressed, cannot be done without substantial expense. That last point reflects Mr. Justice Parker's observation: "There can nevertheless be no doubt that the costs of presenting a fully developed case at the Inquiry and, equally investigating the validity of the appellants' case are very considerable" (para 15.9). It is the need to "investigate the validity" of the CEGB case that, as I understand it, lies at the heart of the objectors' requests to you.

Great emphasis was laid upon the disparity between the immense financial outlay in preparation for the Inquiry by the CEGB, NII, BNFL, Bechtel, Westinghouse and other supporting parties and that which will be available to opponents in the absence of financial assistance to objectors from public funds. They say that, apart from making their position very weak, the effects of that disparity will render it impossible for the Inquiry to have the characteristics of being "full, fair and thorough", which you wish it to have, both in appearance and in reality. From a purely technical point of view, it was asserted that P.W.R. technology will not be "put under the microscope" at the Inquiry as Ministers should wish. To enable that to be done by or with the assistance of objectors would cost a small fraction of the preparation costs of the proponents.

It was recognised by most objectors that if the Government were to grant their request in principle there remain problems about the distribution and use of the money provided. Two approaches were made to the

Page 5/..

practical problem. First, my attention was drawn to the way in which such difficulties had been successfully met in Canada in regard to the Mackenzie Valley Pipeline Inquiry. (The way in which it was handled is set out in the transcript for 1st June at pp 67-68). It was considered there was no serious obstacle to adopting a similar approach in this country.

Secondly, while evidently accepting that no one would ever be entirely satisfied, effective and cooperative arrangements could readily be achieved to ensure fair distribution and proper use of any monies made available.

Critical comment was addressed to the reasons given by Ministers, in correspondence, for resisting requests for financial assistance. These were succinctly and lucidly summarised by Mr. Howell of counsel, appearing for the Friends of the Earth. I cannot do better than to attach an extract from the transcript of the 2nd June (pp 24-27) in which he states the response to Ministers' reasoning, and ask you to regard that extract as part of this letter.

The great majority of those who made representations to me did so on the basis of the contentions I have summarised above. A number of objectors went further and maintained that a failure to provide financial assistance might, sooner or later, have unfortunate political or social consequences. They based their warning on the belief that in the absence of financial assistance, the Inquiry would be seen, or believed to have been, an ineffective or insufficient critical examination of the proposals.

Throughout I have referred to objectors, for brevity, but the

Page 6/..

word is intended to include all parties who sought financial help. But two parties who supported the pleas for such assistance represented those who support the CEGB proposals. Doubtless, there will be other supporters who will wish to seek financial help if the request is granted in principle.

This letter is long and a tax on your time. In view of the considerable feeling and interest in the request I have reported and the anxiety to ensure that no misunderstanding could be reasonably thought to remain in Ministers' minds about the basis and nature of the request, I have sought to cover in outline the main arguments in this letter. As you and your colleagues will, I hope, be willing to reconsider the objectors' requests I am sending this letter to you and Sir Donald Maitland only. At a convenient later time, I hope you may agree to this letter becoming an Inquiry document.

Yours faithfully,

Frank Layfield

Sir Frank Layfield, Q.C.

Copy to : Sir Donald Maitland, G.C.M.G., O.B.E.,
Permanent Under-Secretary of State.

Enclosures:

1. Representative list of relevant requests together with the key transcript references.
2. Mackenzie Valley Pipeline Inquiry - transcript for 1st June at pp 67-68.
3. Friends of the Earth - Extract from the transcript of 2nd June (pp 24-27)

Parties raising the question of funding (in order of appearance at the preliminary meeting; references are to the transcripts of that meeting, Day 1 is June 1 and so on).

1 Welsh Anti Nuclear Alliance (Mr Richards); Day 1, p 37
General request for funding

2 Portskewett Action Group (Mr Hancock); Day 1, p 38
Ditto

3 Mr Stuart (individual objector); Day 1, p 40-44
Imbalance between GCGB's resources and those available to objectors; funding required to ensure a full and thorough Inquiry; CEGB should fund all bona fide objectors.

4 Council for the Protection of Rural England (Mr Grove-White); Day 1, p 45
Imbalance in resources; request for £50,000 to finance research into the economics of the PWR (letter of 1 April to the Inspector)

5 Town and Country Planning Association (Mr Blake); Day 1, p 51
Funding needed to ensure the public credibility of the Inquiry; a fund of Government or CEGB money (minimum of £¾m) be made available for independent research.

6 Dr Wakstein (individual objector); Day 1, p 59
Request for £17½ thousand plus expenses to analyse safety problems.

7 East Anglian Alliance Against Nuclear Power (Mrs Armstrong); Day 1, pp 66-68
Effective presentation of objectors' cases requires funding. Such funding would not be too costly, and could be administered, if necessary, along lines used at the Mackenzie Valley Pipeline Inquiry in Canada.

8 Anti Nuclear Campaign (Dr Arnott); Day 1 pp 75-77; Day 2 pp 37-38
Funding required to ensure a full and competent Inquiry.

9 Friends of the Earth (Mr Howell); Day 2, pp 24G-27A
Funding of objectors needed for a full, fair and thorough Inquiry; it would not create a precedent for other Inquiries since the Sizewell Inquiry would be unique, dealing with major issues of national energy policy; the very availability of documentary material requires funding for its adequate analysis; without public funding, the CEGB's case would not be adequately tested; the necessary funds could not be raised from within the Friends of the Earth's own resources; ways could be found to distribute to objectors any funds made available to them.

10 Mr Bunyard (of The Ecologist); Day 2, p 28
Funds should be made available to bona fide objectors, at least for travel and accommodation.

11 The Suffolk Preservation Society (Mr Popham); Day 2, p 32A
Funding for research at least is essential

12 Cornwall Anti Nuclear Alliance (Mr Pritchard); Day 2, p 40G
Disparity in funds available to the CEGB and those to objectors.

13 National Union of Public Employees (Mr Birch); Day 2, p 46B
General request for funding

14 Mr Lowry (individual objector); Day 2, p 53
Request for funds to defray at least travel and accommodation costs of objectors.

15 Mr Saddler (individual objectors); Day 2, p 55D
Request for funding for research and presentation of cases.

16 Socialist Environment and Resources Association (Mr Blackmore); Day 2, pp606, 62-6
Funding crucial for full, informed and adequate discussion; reimbursement of expenses of those at the preliminary meeting.

17 Ipswich Friends of the Earth (Mrs Webb); Day 2, p 67
Expenses for attending and general request for funding.

18 National Campaign for Nuclear Disarmament (Mr Gerratt); Day 2, p 696
Ditto

19 Mr Irving (individual objector); Day 2, pp 71-2
Would be proper for the CEGB to fund objectors since it is in the electricity consumer's interest for the Board's application to be tested as thoroughly as possible.

20 Wansbeck District Council (Mr Gray); Day 2, p 74A
General request for funding

21 A Power for Good Ltd (Mr Greenhalgh); Day 2, p 75
Funding for counsel; for research into safety and environmental impacts of non-nuclear fuels.

22 Pro-Nuclear Power People (Mr Stanley); Day 2 p 76
General request for funding

23 Dr Little (of Ridgeway Consultants); Day 2, p 786
Funding for legal representation.

24 National Union of Mineworkers (Mr Bundred); Day 3, p 17A
Supports views of ANC, Friends of the Earth and others.

25 Scottish Campaign to Resist the Atomic Menace (Mrs Hendry); Day 3, p 20A
Supports TCPA's case for funding.

26 Mrs Hendry (individual objector); Day 3, p 21D
General request for funding

27 Mr Stoner (individual objector); Day 3, pp 21-22
Bona fide objectors should be given funding for research; would not be unjust for the CEGB to provide this.

28 Ipswich Constituency Labour Party (Mrs Sierakowski); Day 3, p 25E
Labour party usually have reservations on funding of objectors but nature of the Inquiry is such that it should be treated as a special case from the point of view of funding.

29 Mr Slightholme (individual objector); Day 3 p 27H
Funding required for a fair and thorough Inquiry.

30 Miss Foster (individual objector); Day 3 p 40B
General request for funding

31 Fire Brigades Union (Mr Immanual for Mr Segars) and TGWU Agricultural and Allied Workers Trade Group; Day 3, p 42. Suppprts views of NUM, NUPE, ANC and others.

Mrs J Armstrong (East Anglian Alliance Against Nuclear Power)

Day 1 pp 67-68

The second point put in defence of funding is the problem of who would have the money and what it would be used for. This again is a very limp excuse. If this country does not have the ability to administer a fund then we can take on the Canadian system from which I intend to quote in a minute. Their objection is that of precedent. I think it is worth saying there has never been a Public Inquiry like this before, and it is also worth saying there is such a thing as a good precedent. The present situation, just to fill you in, is this. The Department of Energy have turned down any question of funding . However, their letters have been totally contradictory. They say they deny funding but state the Inspector will take objectors' interests fully into account in reaching a recommendation. I ask you, how can you do this if we are denied from appearing even at the Inquiry? You will be unable to know what on earth our objection is as far as the CEGB are concerned.

Since it was revealed the Board is financing the whole Public Inquiry I think it is fair to say objectors have taken a different view to accepting funds from that particular body, and there was a short article in the Sunday Times of 16th May which said that the CEGB were ready to pay towards the costs of objectors to the scheme, but no fund has been established, and no public announcement has been made on this point.

A third initiative which perhaps you ought to know about is that of the local M.P. of this area, the M.P. for Eye, who has set up some kind of trust fund. After a great deal of correspondence with him he has now named three trustees, but there is no money in that fund and there is no promise of money from anybody. I think the whole thing is rather academic. Neither side, those who would be thinking of putting money in or those wishing to apply for funds, have been approached about the trustees, and I think we could write off that fund altogether. However, time is running out, and a decision may be reached and publicised in the very near future.

The Alliance has looked in detail at the Canadian system of funding which was first used by Judge Burger at the Mackenzie Valley Pipeline Inquiry and used on several occasions since. We

I turn to the first of those arguments which is based on precedent. The fear appears to be that to give money to objectors at this Inquiry would lead to paying money to objectors at all Inquiries to the detriment of the taxpayer. Sir, that is not an argument which is decisive with the Secretary of State. In the debate in the House of Commons in February of this year, he was prepared to consider public funding, notwithstanding the fear of any precedent it might create. In fact, in my submission, it would not create a precedent. This Inquiry is unique. It will be an Inquiry into the major issues of national energy policy for the rest of this century. To make a worthwhile contribution the participants will have to have a fund of expertise at their disposal. It is quite unlike the normal planning Inquiry as you, sir, will be aware. The fact that Regulations governing the procedure at this Inquiry may be made under the self-same Section as those of planning Inquiries, is, in my submission entirely irrelevant. It is not even similar to a major motorway Inquiry. Issues of the merits and the needs underlying the national road programme, are not principal issues to be investigated at such Inquiries. The scope of the issues go way beyond what one would normally expect with the normal run-of-the-mill Inquiry and payments to objectors in this case could not conceivably create a precendent for those other Inquiries.

Even if public funding did create a precedent, it would nonetheless be in the taxpayers' interests that the money should be paid. The scale of public expenditure involved is so large that any sums paid to objectors would be comparatively trifling and they might serve to secure a rigorous and objective testing of the merits of the public investment involved.

Sir, such public funding would be justified to ensure that any decision to commit taxpayers' money was taken in the light of the best information reasonably obtainable.

I turn to the second reason which has been offered, the availability of documentary material. As I have already pointed out, even if further material is available, it cannot be fully understood or tested by objectors without funds available to them. Without such funds, the availability of such documentation may only extend the benefit to my clients of providing more paper for them to re-cycle!

Sir, the third reasnn advanced by the Secretary of State is the distinction, sir, in which he holds you and the Assessors yet to be appointed. The point of the Inquiry is not for you and the Assessors simply to hear the case for the Board, it is for you to hear that case tested. It will not be tested unless the case against the proposals is thoroughly put. The Friends of the Earth have no doubt whatsoever about your scrutiny and your Assessors' integrity in examining those proposals. However, sir, in my submission that would be no substitute for the scrutiny of a well prepared cross-examination, the illumination to be derived from a variety of expert opinion and the rigour introduced into any Inquiry by the presentation of conflicting views at it. Sir, even the Devil needs his own advocate.

Without public funding my clients fear that you and your Assessors will be submerged beneath the mass of material to be presented by the Board without any assistance from others to help you analyse, digest or appra se the arguments advanced.

The point of the Inquiry is to hear both sides and without public funding both sides will not be properly heard.

May I turn to the fourth argument which has been raised in Hansard, which is that the money is not needed? Sir, Windscale has been cited as an example of an Inquiry which demonstrates that public funding is not needed. You heard yesterday the benefit of Mr. Justice Parker's remarks on that matter. I can only speak for my clients. They were certainly not happy with the resources available to them to present a case at that Inquiry. They felt it was seriously deficient in consequence in a number of respects. My clients will not have the same resources available at this Inquiry as they did for Windscale. The same costs today amount to more than their total income for the last finance year. Moreover, the fact is that in the present recession they can see no reasonable prospect of raising such a sum even by a special appeal. My clients will have spent shortly after this pre-Inquiry meeting sums in total of £10,000 in preparing this case. That fund is now nearly exhausted.

I have no wish to go into the details of the difficulties which continuing in this Inquiry will present my clients with but, sir, you and the Secretary of State will wish to know that there are particular difficulties even in mounting a serious campaign for funds by my clients. Such an appeal wou result in my clients' other activities being severely curtailed by the diversion of their limited staff to fund raising. It would also mean that they could not adequately prepare their case fo. Sizewell. The staff employed in fund raising would not be able to contribute properly to the preparation of the case. No-one should be under any illustion whatsoever about the scale of costs of presenting a case properly at this Inquiry. A case which is not properly prepared will not be of very great assistance of illumination to you, sir, on the technical issues. It is not simply a question of maintaining a team and accommodating witnesses in Suffolk, it is a question of the research which goes into the case. It requires many experts, and many experts who simply cannot be found in this country.

Friends of the Earth have in the past been commissioned by the Atomic Energy Authority of the United Kingdom to carry out research. They have a long-standing interest in the issues which are the subject of this Inquiry. They are a body who should be enabled to participate properly in that Inquiry if the Inquiry is to be seen as full, thorough and fair, as both the Secretary of State and the Board desire. So I say plainly, funding is necessary in order to enable them to do so.

The final ground on which public funding is objected to is in distributing any funds made available. I have no

doubt that no-one will ever be satisfied with what they might receive, but that is not really an argument against making funds available. My clients could more easily live with the dissatisfaction of having not enough money than with the dissatisfaction of having no money whatever.

A

The Friends of the Earth would, therefore, in principle like to join their support to the representations which you have already received in connection with funding from the Campaign for the Preservation of Rural England, from the Town and Country Planning Association, from the East Anglia Alliance Against Nuclear Power, from the Anti Nuclear Campaign and from the Welsh Anti Nuclear Alliance. Sir, the Friends of the Earth's case is that public funding is necessary not because the Friends of the Earth and other objectors want it, but it is necessary in the public interest. It is necessary to ensure that this Inquiry is not abortive and that it is full, fair and thorough. It is a worthwhile investment of the tax-payer. It would ensure that a decision which may assist in determining how public expenditure is invested, is made in the light of the best information and assessment available.

B

C

Sir, funding the objectors is the only way in which the public will be re-assured that PWR technology is acceptable. That has already been made perfectly plain by the representations which you have received at this pre-Inquiry meeting from Mr. Stuart, among others. It is in the national interest and, indeed, in the Board's interest that this Inquiry should be seen to be full, fair and thorough. Unless funding is made available it will not be seen to be so.

D

CONFIDENTIAL

Energy

DEPARTMENT OF THE ENVIRONMENT
2 MARSHAM STREET
LONDON SW1P 3EB
01-212 3434

MINISTER FOR LOCAL GOVERNMENT
AND ENVIRONMENTAL SERVICES

30 JUL 82

Dear Nigel

FAST REACTOR POLICY

I have seen your letter of 16 July to the Chief Secretary, his reply of 23 July and also John Sparrow's letter of 22 July.

I have no objection to the timetable you propose. As you say, this is a major issue, and we need to be sure that the various options have been rigorously evaluated.

There are, of course, important environmental implications to be taken into account, and I would propose to seek the advice of the Radioactive Waste Management Advisory Committee on these aspects.

I am copying this letter to members of E Committee, Sir Robert Armstrong and John Sparrow.

Yours

TOM KING

The Rt Hon Nigel Lawson MP

Energy Policy Pt 7

CABINET OFFICE

Central Policy Review Staff

70 Whitehall, London SW1A 2AS Telephone 01-233 7765

From: John Sparrow

Qa 06003

CONFIDENTIAL

30 July 1982

The Rt Hon Nigel Lawson MP
Secretary of State for Energy
Thames House South
S W 1

Dear Nigel,

Oil Depletion Policy - Response to the Report from the Select Committee on Energy

I have seen your letter of 26 July to the Chancellor of the Exchequer enclosing a proposed Government reply to the Select Committee on Energy's Report on Oil Depletion Policy.

I support the proposed statement and welcome your decision on the use of reserve powers as part of the general policy of allowing market forces to set depletion rates.

I am sending a copy of this letter to the recipients of yours.

Yours sincerely,

John.

John Sparrow

CONFIDENTIAL


30 JUL 1982

Energy

Treasury Chambers, Parliament Street, SW1P 3AG
01-233 3000

28 July 1982

The Rt Hon Nigel Lawson, MP
Secretary of State for Energy

Dear Nigel

OIL DEPLETION POLICY - RESPONSE TO REPORT FROM SELECT COMMITTEE ON ENERGY

Thank you for sending me the draft response to this Report (26 July - attached). As you say, it reflects comments made by John Wakeham; and I am happy for it to go out in both our names.

I am copying this letter to the recipients of yours.

Yours

GEOFFREY HOWE

5

SECRET AND PERSONAL

Energy

File LL 4

cc N Vereker

10 DOWNING STREET

From the Private Secretary

27 July 1982

Dear Julian,

WATER SUPPLIES TO THE CEGB

Your Secretary of State minuted the Prime Minister on 21 July about the vulnerability of the CEGB to industrial action in the water industry.

The Prime Minister agrees, subject to the views of colleagues, to your Secretary of State's proposal to ask the CEGB to set action in hand on an expenditure programme of upwards of £10 m. (within the CEGB's capital expenditure plans) to achieve substantial independence from any disruption in the public water supply system.

I am sending copies of this letter to John Kerr (H.M. Treasury), David Omand (Ministry of Defence), David Edmonds (Department of the Environment), Muir Russell (Scottish Office), Adam Peat (Welsh Office), Barnaby Shaw (Department of Employment), David Wright (Cabinet Office) and Gerry Spence (CPRS).

Yours sincerely,

Michael Scholar

J. D. West, Esq.,
Department of Energy.

SECRET AND PERSONAL

Prime Minister (1)

Agree, subject to colleagues views', to publication of this reply?

MLS 26/7

01 211 6402

The Rt Hon Sir Geoffrey Howe QC MP
Chancellor of the Exchequer
HM Treasury
Parliament Street
LONDON
SW1P 3AG

26 July 1982

Dear Chancellor,

OIL DEPLETION POLICY - RESPONSE TO REPORT FROM SELECT COMMITTEE ON ENERGY

I attach a draft response to the above Report. will request if required

As we have agreed, this deals with both the depletion aspects and the Committee's criticisms of the North Sea fiscal regime. It will therefore go out in both our names.

As regards depletion policy per se, there is much in the Report with which, I am sure, we can both agree. Effectively, it argues that we should let market forces work and that any general Government intervention should be restricted to a possible future situation where the national interest is clearly and substantially at risk. While the Committee's rather cavalier treatment of the fiscal regime clearly cannot be allowed to go unchallenged, I think we should welcome the general thrust of the Report in emphasising the need to encourage exploration and development. A response on these lines would also help to improve the oil industry's confidence and attitudes.

Events have moved on since David Howell made his depletion policy statement in 1980. We have already announced that there will be no production cuts before 1985 at the earliest. A number of development proposals have been deferred by the companies and those that we expect to come forward are unlikely to result in substantial new quantities of oil starting to flow until we are over the mid-1980s "hump". In these circumstances I agree with the Committee's conclusion that there should be no direct and general intervention to restrict North Sea production, subject only to the safeguard of "reserve powers". A clear statement on these lines would be welcome news to the oil industry as well as our EC partners.

I believe it is most important that we get the reply to the Committee before the House rises for Recess. (We have already overshot the two month deadline for responding to Select Committee Reports). The substance of the draft has been agreed between our officials. I also understand that the part dealing with the fiscal regime reflects some comments made by John Wakeham. I hope therefore that you will be able to let me have a reply by close of play on Tuesday 27 July.

I am copying this letter and the draft reply to the Prime Minister, Francis Pym, Patrick Jenkin, George Younger, Sir Robert Armstrong and John Sparrow.

Yours sincerely,

N.L.

pp. NIGEL LAWSON

(Approved by the Secretary of State
and signed in his absence)

SELECT COMMITTEE ON ENERGY

NORTH SEA OIL DEPLETION POLICY

MEMORANDUM BY THE SECRETARY OF STATE FOR ENERGY
and THE CHANCELLOR OF THE EXCHEQUER.

Introduction

The Government welcomes the Committee's Report (published on 18 May 1982) as a thoughtful and constructive contribution to the consideration of the important question of the depletion of the nation's offshore oil reserves.

2. The Government cannot accept some of the Committee's arguments and conclusions, particularly the criticisms of the North Sea Fiscal Regime. But it agrees with the Committee's general conclusion that the emphasis at the present time should be to encourage exploration and development. The Government's objective is to maximise economic oil production over time. It has already announced that it does not intend to impose production cutbacks before 1985 at the earliest. It also considers that it would not be appropriate in the foreseeable future to delay development. There are, however, as the Committee recognise, many uncertainties on the oil scene and the Government welcomes the Committee's recommendation of the need for the Government to retain reserve powers which could be implemented should circumstances change. Meanwhile the need for good oil-field practice and the tight control of gas flaring will continue to be given higher priority.

Government's Approach

3. Oil depletion policy must be consistent with the main thrust of the Government's wider economic policy objectives. As the Committee recognise, the Government has to consider very carefully both the macro and the micro economic effects of depletion decisions. These include the contributions current revenues make to the nation's prospects of general economic recovery; the possibility that, with rising oil prices, the revenues might ultimately be higher if production were delayed; and the effects that depletion controls might have on the thorough exploration and exploitation of the UK Continental Shelf.

4. Decisions on the rate of production would be much simpler if the future could be predicted with any certainty. As the Committee recognise, this is not possible. Uncertainties exist over world oil supply prospects, the ultimate size of the UK's recoverable reserves, the exact pattern of UK demand and supply over time, production costs, the future path of oil prices, the possible returns from alternative investments, and the particular relationships that may exist between the rate of oil production and other macro-economic factors. In particular, the future path of oil prices, which is crucial to any decision to intervene directly and sensibly to control UK oil production, is highly uncertain. The Government agrees with the Committee that clear economic advantages need to be demonstrated before a restrictive depletion policy can be justified. Such a clear economic advantage cannot be demonstrated, and in the Government's view the uncertainties are too great to justify Government action in the foreseeable future to delay UK oil production.

5. The Government attaches great importance to retaining the confidence of the UK oil industry. Depletion is one of the factors which determine the attractiveness of the UK as an operating environment for the oil companies. Other factors include licensing arrangements, the fiscal regime and political stability. The Government hopes that its recent announcement that there will not be production cuts before 1985 at the earliest, and this response to the Committee's Report, will be further encouragement to the oil industry to continue to invest in the North Sea.

6. The statement on oil depletion policy made by the then Secretary of State for Energy (The Rt Hon David Howell MP) on 23 July 1980 emphasised the major uncertainties about future levels of North Sea production and UK consumption which pointed to a flexible, case by case, approach to depletion decisions. The statement also stressed the need to ensure good oil-field practice at existing and new fields and stated the Government's intention to tighten control of gas flaring. Good oil-field practice and control of gas flaring remain essential to achieve optimum oil and gas recovery in the national interest.

7. The Report suggests (paragraph 19) that "If the income over time from oil exploitation is maximised by the uninhibited actions of the oil companies it should also follow that Government revenues would also be maximised if the tax system is designed to avoid distortions". It goes on to recognise (paragraph 21)

that the Government may have a different perception of the optimal depletion rate from the North Sea. This difference in perceptions may also arise at the field level. As the Committee note, the oil companies tend to use higher discount rates than the Government in valuing the streams of expenditure and income likely to arise from a new field and in assessing the attendant risks. The result is that companies will tend to put greater emphasis on high levels of production in the earlier years of field life, the Government relatively more emphasis on maximising the total amount of oil recovered over the lifetime of a field. All oil-field experience shows that too rapid a rate of depletion in the earlier years of a field's life can prejudice the total amount of oil ultimately recovered from a field. In these circumstances, it is not necessarily true that what is good for the oil companies is good for the nation. The Department of Energy therefore needs to pay particular attention to improving recovery ratios by ensuring that field development proposals are adequate to drain the likely oil accumulation(s) effectively (through the arrangement of production facilities, drilling programmes and well producing rates), and that pressure maintenance techniques are employed wherever possible at an early stage in field life.

8. The Government policy of reducing gas flaring where technically and economically feasible has succeeded in bringing it down from the peak rate of 21.5 million cubic metres a day (mcmd) in June 1979 to 12 mcmd in May 1982, while oil production has increased by 30% to its present level of around 2 million barrels a day. The purpose of reducing flaring for later recover of the gas is to conserve a valuable resource in its own right, rather than as the Report implies (paragraph 76) to delay oil production (although that may in certain circumstances be an indirect consequence of flaring restrictions).

9. The Government agrees with the Committee that development delay is preferable to other available depletion controls. In economic terms, development delays are to be preferred to production cutbacks because costs, as well as production (and hence revenues) are delayed. Where a new field has discounted costs amounting to half its present value revenues, delay in developing the field begins to become economically attractive if oil prices rise in real terms at only half the discount rate; whereas production cuts, as the Committee recognise, only do so when the rate of increase in oil prices exceeds the discount rate.

10. Any development proposal now coming forward is unlikely to result in oil starting to flow until after the peak years of 1985-86 envisaged in the Department of Energy's central projections. In view of all the uncertainties and taking account also of the need to avoid any fluctuations in orders for new developments, in the interests of the offshore supplies industry (Report, paragraph 83), the Government agrees that there is no case in the foreseeable future for deferring new field developments. The Committee may be assured that there have not been, and will not be, any avoidable delays in consideration by the Department of Energy of new field development proposals.

11. The Government considers that what is required in the present circumstances is a pragmatic and flexible approach concentrating on:-

- the monitoring role favoured by the Committee;
- conserving gas for later recovery where technically and economically feasible by continuing a tight flaring policy;
- encouraging further exploration (see paragraphs 15 - 20 below).

There is thus a wide measure of agreement between the Committee and the Government on the approach to oil depletion policy.

12. It is, however, the Government's intention to retain reserve powers of intervention, as the Committee recommend, against the possibility of some clear shift in the oil market or elsewhere which threatened to open up an important divergence between the national interest and the established pattern of depletion on the UKCS.

13. These powers will not be used lightly. The circumstances of their use would indeed relate (Report, paragraph 92) to "specific and overriding requirements in the national interest or to a radical change in circumstances pertaining to the UKCS and its development". The Committee gives an illustration of two such situations (Report, paragraph 46). To seek to move from illustration to specification of the conditions in which such controls would be activated (paragraph 92) is, however, unrealistic. The Government cannot responsibly constrain its ultimate freedom of manoeuvre. What is has done, and will continue to do, is to illustrate by its actions that there will be no wanton interventions to disrupt company expectations of their prospects on the UKCS. If circumstances should change such that it became necessary to consider seriously the use of reserve powers, the Government would certainly consider what assurances might be given in parallel.

14. For the reasons given above (paragraph 9), if reserve powers have to be used, development delay is to be preferred to other available options, as the Committee recognise. Royalty banking involves certain costs and potential risks for the Government, associated with the lack of incentive for companies to recover the banked oil when fields are in decline. It is not, therefore, an acceptable option.

The Longer Term - Licensing and Exploration Policy

15. The Government attaches importance, as does the Committee, to encouraging more exploration.

16. Much has already been achieved. 47 exploration wells were started in 1981 - the highest number since 1977. Including appraisal drilling, 73 wells were started, a total higher than that of any of the three preceding years. Latest figures for the current year suggest that the level of exploration in 1982 will be higher still.

17. The Government has also increased the pace and scale of licensing through more regular and larger licensing rounds: the Seventh Round was as big as the two previous rounds together and attracted a high level of interest. The application rate for blocks in deep waters (up to 3000 feet), was high - 22 out of 34 on offer - even though no special incentives (as proposed in paragraph 86(ii) of the Report) were offered. Altogether, 90 blocks were licensed - the highest number so far in any round since the Fourth - including 42 in areas commanding a £5 million premium. Some drilling under Seventh Round licences has already been undertaken, with encouraging results.

18. The Government proposes to license about 85 blocks in the Eighth Round. There will be a wide choice of blocks, in line with a suggestion made to the Committee by some of the companies. Areas in which there has as yet been no exploratory drilling will be opened up and further opportunities provided for exploration in the established gas province of the Southern Basin of the North Sea. The Round will for the greater part be based on the discretionary system but some blocks will be put up for auction. The terms of future licensing rounds will be kept under review.

19. The Government does not discount, as the Committee appears to do (Report, paragraph 86 (iii)), the importance of exploring territory licensed in the early rounds. These rounds involved large acreages. Until this territory has been drilled its prospectivity cannot be assessed. Some companies have tended to concentrate exploration activity in the particularly attractive territory offered in later rounds. The Government looks to the companies to increase their efforts in neglected territory.

20. The success of the Government's licensing and exploration policy will be kept under careful review as will the possible need for incentives to encourage exploration in frontier areas, such as the allocation of larger areas for individual licensing or longer periods for exploration (Report, paragraph 86(ii).

Fiscal Regime and Depletion Policy

21. While tax must clearly be a factor to be taken into account in considering the implications of any depletion policy, the Government agrees with the Committee's view (paragraph 93 of the Report) that the fiscal regime is not (for reasons identified by the Committee) a suitable instrument for implementing such a policy, and the Government has not attempted to use it in this way. The Government's own analysis of the effects of the fiscal regime on North Sea development does however differ significantly from that made by the Committee.

The Level of Tax and Development

22. At paragraph 87 the Committee concludes from the evidence put to them that there is a substantial risk that development is being discouraged directly and indirectly by the form of the fiscal regime. The Government does not accept this conclusion. Before making its recent Budget proposals for oil taxation, the Government consulted very fully with the oil industry and considered carefully such evidence as oil companies provided on the effects of the tax regime either generally or on particular projects. In evaluating this evidence it is of course necessary to look critically at generalised assertions and so far as possible to seek more detailed evidence on the profitability of investments. The Government made its own thorough analysis of profitability both in relation to existing fields and also, on the best information available, in relation to likely future developments. The methodology used and some of the conclusions as at December 1981 were explained in the Treasury's Supplementary Memorandum (Q.2a, 2b and 3).

23. There is close and continuing consultation on this work between the Treasury, the Inland Revenue and the Department of Energy. The position is regularly updated in the light of revised forecasts of oil prices, costs and production profiles. Full use is made of the information supplied to the Department of Energy on individual projects. Returns are examined against a variety of different assumptions. (For example, although the North Sea oil price fell by $4 just before the 1982 Budget, this was well within the price sensitivities tested.) A number of different indicators of profitability are examined, including internal post-tax real rates of return, net present values, and cash flows. Some guidance on the ranges of profitability which are likely to be regarded as acceptable by the industry can be found in evidence on existing projects, and in particular in evidence of forecast returns on these projects at the time it was decided to undertake them. On the basis of detailed analysis on these lines, and a critical appraisal of the industry's own representations, the Government believes that a wide range of potential developments in the UK Sector of the North Sea remains attractive. It considers that the fiscal regime is fully compatible with a satisfactory flow of new developments.

24. The Government has carefully examined the factors affecting the deferments mentioned by the Committee in paragraph 73 of the Report and other alleged decisions to postpone developments. It is not convinced that the level of tax has been the determining factor except in one of two cases where it appeared that the pre-1981 system was giving greatly excessive tax reliefs to incremental projects not justified in pre-tax terms. Apart from these, in cases where individual factors have been identified, other factors - in particular price uncertainties and specific technical problems - have been more significant than tax.

25. Obviously this is an area where difficult questions of judgment are involved, and the Government will bear the Committee's concern in mind. However this year's changes - apart from their important structural features (discussed below) - will reduce the burden on the companies by around £90 million in 1983-84 (allowing for the interest cost of accelerated payment). Important further modifications of the original Budget proposals were made at Committee Stage of the Finance Bill. These were designed to meet specific concerns of the industry in relation to less profitable fields. Continued discussions are being held with UKOOA on specific issues, in particular marginal fields and incremental investments in existing fields; the intention is that these should be based, so far as possible, on

more detailed information than the industry has provided hitherto about post tax profitability and cash flow.

The Structure of the Tax Regime

26. As well as expressing concern about the level of tax, the Report also criticises its structure and calls for a thorough overhaul of the regime. (Some detailed comments on these criticisms are given in the Annex.) A number of important structural changes were introduced in the 1982 Budget and Finance Bill, which have now been further modified (subsequent to the Committee's Report) in a number of important respects by the changes announced by the Chancellor on 9 June. All these changes move in the direction sought by the Committee. From the beginning of 1983, the Supplementary Petroleum Duty which is based on gross revenues will lapse, and the arrangements for advance payment of PRT (APRT) will commence. While it is true that APRT will itself be calculated on the basis of gross revenues like SPD, it differs critically from SPD (which is a separate tax imposing its own permanent additional burden) in being an advance payment of PRT which is itself based on profits. It will normally be fully set off against normal PRT liabilities once these arise. And, following the modifications announced on 9 June. liability to APRT will run for a maximum of five years for any single field and any APRT not set off within 5 years will be fully repaid then (rather than at the end of field life under the original proposals). The impact of APRT on less profitable fields has been modified to an important extent by these changes. Moreover liability to APRT (like SPD) arises only after an oil allowance of 1 million tonnes a year per field, which provides very substantial relief for smaller fields (whether these are more or less profitable).

27. It is true that APRT will still impose some tax liabilities before costs have been fully recovered. Indeed it is a main objective of APRT, like SPD before it, to ensure, following the increase in the real price of oil in the late 1970s, that the Exchequer should get some benefit from larger fields in their early years of production. Nevertheless, given that no PRT (apart from APRT) and no corporation tax are due until after costs have been fully recovered, the UK tax system still gives much more "front end loaded" tax relief than most other tax systems. (For example, under the Norwegian system mentioned in the Appendix to the Committee's Report, relief for capital expenditure is spread over 10 years for both corporate tax and the Norwegian special tax.)

28. The Report refers (paragraph 74) to the continuing comparative complication of the North Sea fiscal regime, and also (paragraph 75) to the view of the Comptroller and Auditor General (in his Report on the Appropriation Accounts for 1980-81) that the effects of the present regime are difficult to calculate and are not readily predictable. The Government accepts that the regime remains a relatively complex one, although it believes that abolition of SPD as a separate fourth tier tax and the introduction of APRT (which has been built into the existing PRT structure and will now cease to have any relevance for any particular field within five years of first payment) achieves a modest degree of simplification. It is however inevitable in the Government's view that a regime which is designed to meet multiple objectives and to reflect the widely differing circumstances of oil development in the North Sea should be relatively complex. This is generally the case with oil tax regimes in other countries where the combination of some form of special tax with the normal corporate tax and royalties (which are a normal contractual obligation accepted by oil companies the world over) is commonly found. This complexity does, however, need to be seen in context. The taxpayers concerned are few in number, highly sophisticated and well supported by computer skills. There is no difficulty for them - or the Revenue - in calculating the effects of the regime, or the interactions of its different elements, on the basis of any given set of assumptions. There are of course major problems in predicting profitability of particular projects but this is not due to the complexity of the regime but to large uncertainties about the future of oil prices, production costs and production profiles. However the system might be simplified, these uncertainties would remain (as the Report recognised in paragraph 91).

29. The Report refers (paragraph 73) to the frequent changes in the system. It is true that it has not been possible to provide the degree of stability which had been originally hoped. But the economics of oil production changed so radically as a result of the increase in real oil prices in 1979/80 that it would have been unrealistic to expect that the level of tax or the form of its associated main reliefs could remain unchanged. The main changes made by the present Government reflect this. There has also been a good deal of more technical legislation which has been necessary, often to meet problems put to Government by the industry. The latest changes have, of course, been made specifically in response to representations by the industry on the case for further structural changes.

A New Tax System?

30. The Report calls for a radical change in the tax system. It lists some desiderata for such a system in paragraphs 74 and 87: simplicity, stability, neutrality in its effect on incremental investments, progressivity to take account of large differences in unit costs and profitability, and a level of tax to ensure that high cost fields viable on a pre-tax basis remain so on a post-tax basis. The Government accepts these are in general terms all desirable features. There are however other objectives not referred to by the Committee - in particular the need to secure for the nation a fair proportion of the revenue from a national resource, and the need, where changes are made, to minimise disruptive transitonal problems. And in the real world objectives will be found to conflict to some extent (eg some of the original reliefs designed to take account of differences in unit costs and profitability between fields were found to distort incentives for incremental investment, and a system which provides for rapid recovery of initial costs, and thus for a higher effective rate of tax later in field life, cannot be wholly neutral in its effect on the timing of incremental investments). What has to be achieved is a system which reconciles the various objectives to the maximum extent possible in practical terms. This can only be tested against precise proposals.

31. The structure proposed by the Government following this year's Finance Bill does in the Government's view represent a carefully considered attempt to meet so far as possible the various desiderata and objectives involved in a practical way. Apart from contractual royalties, it will be a system which, once any APRT liability has been set off or repaid, will be fully based on profits. It recognises differences in unit costs and profitability through the important PRT reliefs of oil allowance and safeguard. Detailed analysis has shown that after-tax rates of return on incremental investments after payback has been reached will, following the abolition of SPD, be very close to pre-tax rates of return. Small fields will pay little or nor APRT or PRT (mainly due to the oil allowance) and post-tax returns are therefore not much more reduced compared with pre-tax returns than the returns of any other investment in the economy.

32. The Committee do not themselves spell out the form which they consider the tax structure would have to take to achieve the objectives more satisfactorily than the proposed system. Nor have they attempted to quantify the implications of their ideas in terms of cost (although they express the belief

that the loss of revenue in the short term would be comparatively small). It is difficult for the Government to give a fully considered reaction to the Committee's ideas without knowing what sort of tax system they have in mind. The Government has devoted considerable effort and resources over the past few years to analysing a wide range of alternative tax systems, including for example schemes where tax is explicitly linked to profitability (on the lines recently proposed by the Institute of Fiscal Studies). It does not believe that these alternatives would meet the various objectives involved more satisfactorily than the structure it now proposes. And it has noted that the industry itself is opposed to changes that would involve an unnecessary degree of structural upheaval, together with major uncertainties and significant transitional problems. The Committee themselves have stressed the objective of a greater degree of stability and the undesirability of frequest substantial changes. The Government is therefore opposed to the Committee's recommendation of another fundamental review.

33. The Government believes that the proposed oil tax system provides a reasonable compromise between conflicting objectives and a sound basis for the future. It will, of course, continue to discuss with the oil industry particular problem areas and has certainly not closed its mind to the possibility of detailed improvements if a case can be made out for these. But, as the Chancellor said in his Budget Speech, the Government hopes that the structure of the fiscal regime following this year's Finance Bill will provide a more secure and stable regime for the future, permitting development to go ahead uninhibited by major fiscal uncertainties.

The Fiscal Regime - Some Detailed Comments

Paragraph 71

The marginal rate of tax relief on an investment made after the safeguard has expired is 89.5% where the expenditure qualifies for royalty relief as conveying and treating costs under First to Fourth Round licences - the same as the marginal rate of tax on the resulting income. This results in the post-tax rate of return being very close to the pre-tax rate of return. Where royalty relief is not available and the marginal rate of relief is 85.6%, the difference is still not great. For expenditure at an earlier stage in field life the rate of relief is higher and can exceed 100% but the company normally has to wait for relief to be effective. This can result in post-tax returns being either somewhat higher or lower than pre-tax reliefs, depending on timing, but perfect neutrality is by and large not compatible with a system of front-end loaded reliefs, with tax low in the early years of a field life and high later on.

Paragraph 73

Companies paying PRT do not pay tax at a marginal rate of over 100% on North Sea profits. Because PRT is a tax on oil production profits and there is a ring fence around such profits for corporation tax, losses on activities outside the North Sea cannot be used to reduce North Sea taxes. If losses are being made at the margin outside the North Sea then the marginal rate of tax on a company's activities overall could in principle amount to over 100%. But the ring fence was introduced in 1975 precisely to stop losses outside the North Sea eroding North Sea tax take (see the Report of the PAC 1972/73) and we assume the Committee does not propose the ending of this principle which could put Government's share of North Sea revenues seriously at risk.

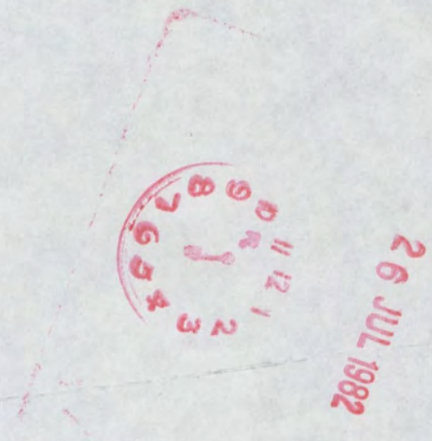
The paragraph suggests that when a field is paying tax at the full marginal rate of 90.28 per cent the sahre of total liability taken by taxes on gross revenues is 36 per cent. However even under the present system with SPD, it would be more accurate to say that the percentage is 22 per cent; under the proposed regime it will be between 0 and 14 per cent. All existing fields, and many future ones, come under the first to fourth licensing rounds where conveying and treating costs are allowed against royalties. So to the extent that these costs are allowed royalties are not based on gross revenues; SPD is (although there is a substantial oil allowance not directly related to costs) but APRT is not in that once a field is paying at the full marginal rate APRT is

immediately set off against normal PRT based on profits. Under the existing regime, therefore, SPD at 20 per cent is in practice the only tax on gross revenues, equivalent to 22 per cent of the marginal rate. Under the proposed regime no charge on gross revenues will be imposed on fields under the first to fourth rounds, and, where royalties at 12½ per cent are charged under the fifth and subsequent rounds (for which conveying and treating costs are not allowed), the charge on gross revenues will be equivalent to 14 per cent only of the marginal rate. The Committee regard it as anomalous that tax take can increase late in field life; however, this is a corollary of the principle which they stress of giving the maximum front-end loading of relief to allow the cost of investment to be recovered quickly.

Paragraph 102

The opening sentence (on the flexibility of the Norwegian regime) seems difficult to reconcile with the statement in subparagraph (ii). The Government's own analysis of the UK and Norwegian tax regimes indicates that the UK system is much more flexible in giving relief to small fields (possibly including complete exemption from PRT) than the Norwegian system. The UK average tax rate over the whole of field life ranges from 60 - 65% for small fields to percentages in the upper 80s for the very largest. This compares with 80-85% for nearly all fields under the Norwegian system. (The problems and objectives in development in the two countries do of course differ in significant ways, as the Committee recognise).

July 1982


26 JUL 1982

SECRET AND PERSONAL

Prime Minister

I/m have agreed this £10m already.

MCS 26/7

PRIME MINISTER

WATER SUPPLIES TO THE CEGB

I fully support the Secretary of State for Energy's proposal, in his minute to you of 21 July, that he should seek to persuade the CEGB to take action to protect power stations from the possible disruption of water supplies in the ways described. The cost is modest and we can certainly not rule out the possibility of industrial action in the water industry.

I am copying this minute to the Chancellor of the Exchequer, the Secretaries of State for Defence, the Environment, Scotland, Wales and Energy, and to Sir Robert Armstrong and Mr Sparrow.

NT

NT

26 July 1982

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P. 0820

MR SCHOLAR

WATER SUPPLIES TO THE CEGB

The Secretary of State for Energy minuted the Prime Minister on 21 July seeking agreement to the expenditure of about £10 million by the CEGB and some other measures designed to ensure that a substantial majority of base-load power station capacity would have independent water supplies and would therefore be insulated from the effects of severe industrial action in the water industry. In assessing these proposals and whatever comments other Ministers may have there are two broad aspects which the Prime Minister will wish to consider, namely:-

a. are the power stations at significant risk from industrial action in the water industry?

b. if not, do the Secretary of State for Energy's proposals nonetheless represent a worthwhile insurance policy?

The Extent of the Risk

2. This was discussed in paragraph 31 of the report by the Official Group on Water (MISC 61) which was circulated with the Home Secretary's minute of 22 October 1981 to the Prime Minister. Briefly, the position is that if 8 or 9 base-load power stations were simultaneously to be out of action the normal level of electricity supplies almost certainly could not be maintained and restrictions very roughly equivalent to a 3-day week would probably have to be introduced. But the chances of that happening as a result of a strike in the water industry seem slim. It would mean that the mains water supply to each of 9 power stations would have to have failed in such a way that the combined effort of water industry management, outside contractors and servicemen could not repair it. Yet, on average, only one mains water pipe fails each day in the whole of Great Britain. MISC 61 therefore concluded that it seemed inherently unlikely that such a situation would arise.

Are the proposals a worthwhile insurance policy?

3. The Secretary of State for Energy's minute records that 42,000 megaWatts of power station capacity is required to meet maximum demand. Of this, 15,000 megaWatts either already has an independent water supply or does not require it. The Secretary of State estimates that a further 5,000 megaWatts from power stations in urban areas would probably continue to be available. This is clearly guess work, but there is no reason to suppose that it is wide of the mark; during a water strike maximum effort would have to be devoted to maintaining supplies to domestic users and to other key users such as hospitals, and since power stations in urban areas rely on the same water mains there is clearly a fair chance that they would be safeguarded.

4. The second paragraph of the Secretary of State's minute describes the two measures that the CEGB might take to make good the gap between the above capacity of some 20,000 megaWatts which has guaranteed water supplies and the requirement of 42,000 megaWatts. The cost of these measures would be of the order of £10 million, spread over two years and the Secretary of State hopes to persuade the CEGB to meet this from within their existing capital programmes.

5. Although it may be felt that the risk is not great, the Secretary of State's proposal seems sensible. The expenditure is very small in relation to total capital expenditure in the electricity supply industry, or to the cost to the economy if, unexpectedly, a water strike were to lead to power station failures and therefore reductions in electricity supplies; and it might help to discourage militancy in the water industry, where power stations are regarded as a key target in a strike.

Timing

6. The pay settlement date for the water industry is 7 December. It is impossible to judge at this stage how difficult the negotiations will be, but the pattern over the last two pay rounds has been very protracted negotiations with increasing unofficial industrial action. It would clearly be impossible for the measures proposed in the Secretary of State's minute to be well advanced by the time of this year's pay negotiations, but given a reasonably early start they ought to be close to completion by the time of the 1983-84 negotiations.

PLG

P L GREGSON

23 July 1982

RESTRICTED

Prime Minister (2)

Mrs 23/7

Treasury Chambers, Parliament Street, SW1P 3AG

J D West Esq
Principal Private Secretary to
Rt Hon Nigel Lawson MP
Secretary of State
Department of Energy
Thames House South
Millbank
London SW1P 4QJ

23 July 1982

Dear Julian,

FAST REACTOR POLICY OPTIONS

The Chief Secretary is content to postpone collective discussion of the Fast Reactor policy options for a few weeks but he considers it essential that the discussion should take place not later than 10 September so that the policy decisions can be taken into account in the public expenditure bilaterals later that month.

I am sending copies of this letter to the Private Secretaries to Members of E Committee, Sir Robert Armstrong and John Sparrow.

Yours sincerely
Terry Mathews

T F MATHEWS
Private Secretary

RESTRICTED

SECRET

2

MR. SCHOLAR

cc Mr. Mount

Water Supplies to the CEGB

Mr. Lawson's proposal, in his note of 21 July, to authorise the CEGB to spend some £10 million to reduce their dependence on water supplied from town mains, is unexpected: the official group had concluded that it was unlikely that industrial action in the water industry would result in water supplies to power stations being interrupted to an extent that would interfere with electricity supplies.

But however small the risk, the proposed expenditure is tiny in comparison with the cost of interrupted electricity supplies, and I think as a matter of general policy we ought to encourage all reasonable steps to be taken to reduce the dependence of essential national services on union monopoly power. So I hope the Prime Minister will agree to Mr. Lawson's proposal.

22 July 1982

SECRET

CABINET OFFICE

Central Policy Review Staff

With the compliments of
John Sparrow

70 Whitehall, London SW1A 2AS
Telephone 01-233 7765

Energy

NSPM

Mrs 24/7

CABINET OFFICE

Central Policy Review Staff

70 Whitehall, London SW1A 2AS Telephone 01-233 7765

From: John Sparrow

CONFIDENTIAL

Qa 05990

22 July 1982

The Rt Hon Nigel Lawson MP
Secretary of State for Energy
THAMES HOUSE SOUTH
S W 1

Dear Nigel,

Fast Reactor Policy Options

I have seen your letter of 16 July to the Chief Secretary proposing postponement of the E Committee discussion on Fast Reactor Policy until the second week in September. I fully support this proposal.

As you know, the CPRS is being consulted in the preparation of this paper, in line with the original remit from E(80)46th Meeting. It is important that the full implications of the various options are clearly identified, for what will be a major policy decision.

I am sending copies of this letter to the other members of E Committee and to Sir Robert Armstrong.

Yours sincerely,

John.

John Sparrow

CONFIDENTIAL

oio

Prime Minister (1)

Agree, as recommended by Mr Gregson and John Wrighton (see their notes, attached) to Mr Lawson's proposal to spend £10m to protect electricity supplies from a water strike?

MLS 23/7

SECRET AND PERSONAL

PRIME MINISTER

WATER SUPPLIES TO THE CEGB

At present the CEGB take 28m gallons each day from town mains (1 per cent of all water supplies in England and Wales), almost all of which is used for boiler water make-up. (Cooling water taken direct from rivers or the sea raises no difficulty.) Most stations have sufficient storage capacity for only two days operation and the cost of increasing this would be prohibitive. Loss of mains water as a result of industrial action in the water industry would lead to shutdown of a large proportion of the 42,000 mw capacity needed to meet maximum demand, leaving 11,000 mw of plant having an independent water supply and 4,000 mw of gas turbine and hydro-electric plant.

A preliminary assessment of the possibilities for lessening this vulnerability has led the CEGB to the following conclusions:

i) use of local sources of water (including boreholes into aquifers) and on-site purification could provide 13-22,000 mw of additional secure capacity, depending on success in locating underground sources. The Board would expect to achieve 17,000 mw at a cost of about £10m, assuming the necessary licences were granted;

ii) water supplies to the oil-fired stations (4,000 mw) and adjacent refineries at Pembroke and Fawley serve only these complexes. Transfer of ownership of plant and pipelines to the CEGB and the oil companies should secure the supplies. No estimate of the cost, which would be for negotiation, is available at present, but it is unlikely to be considerable;

SECRET AND PERSONAL

iii) in addition 13,000 mw of old plant is located in urban areas on the same mains as hospitals and domestic users. Perhaps 5,000 mw of this capacity would remain available.

In summary:

existing independent capacity	15,000 mw
for £10m expenditure	17,000 mw
transfer of plant (cost unknown, but probably small)	4,000 mw
urban plant	5,000 mw
	41,000 mw

It is clear that the possibility exists of making the CEGB system substantially less vulnerable to the effects of any dispute in the water industry. The Board have sought guidance, before developing more detailed plans, regarding the possibility of industrial action and the likely scope of any Government response. They are concerned to avoid extra expenditure if Government action might be taken to achieve the same end in respect of other industries and the general public.

An official group (MISC 61) last year looked at the threat of and consequences of industrial action in the water industry and my officials have recently consulted the other Departments involved about the CEGB's ideas. I understand that there is some uncertainty about the balance of advantage in what is proposed.

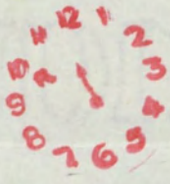
It seems to me that the costs of upwards of £10m, spread over perhaps two years, involved in achieving substantial independence from any disruption in the public water supply system are worth incurring. I would hope to persuade the CEGB to find this from within existing capital expenditure plans. Subject to your views and those of colleagues, I propose to ask the Board to set action in hand.

SECRET AND PERSONAL

I am copying this letter to the Chancellor of the Exchequer, the Secretaries of State for Defence, the Environment, Scotland, Wales, and Employment, and to Sir Robert Armstrong and Mr Sparrow.

Secretary of State for Energy

21 July 1982



RESTRICTED

Prime Minister (2)

MLS 16/7

01 211 6402

The Rt Hon Leon Britton QC MP
Chief Secretary to the Treasury
HM Treasury
Parliament St
London SW1

16 July 1982

Dear Chief Secretary,

FAST REACTOR POLICY OPTIONS

As you know I had planned to put my paper examining the options for future fast reactor policy to E Committee before the summer recess. My predecessor's remit (E(80)46th meeting), was to provide an evaluation of the main options including collaboration with either the Europeans or the US, and scaling down the UK effort to a core team to act as informed purchasers of fast reactor technology when the UK needed it.

We have already achieved a good understanding with France and the US on the principles which might underlie a collaborative agreement with either country. We have also made preliminary evaluations of the economics of the various options. However I would like to refine these before putting a paper to E; I would therefore prefer to postpone collective discussion until the second week in September. This will enable our officials to undertake a more rigorous economic evaluation, which I regard as essential for an issue of this importance; it will also allow the new Chairman of the CEGB time to reach a view on the Generating Board's readiness to participate in any further development of the fast reactor, while still ensuring that we have time to consider the policy issues before the Public Expenditure bilaterals.

I would be grateful for confirmation that you are content with this timetable.

I am sending copies of this letter to members of E Committee, Sir Robert Armstrong and John Sparrow.

Yours sincerely

J.L. Clyde

NIGEL LAWSON

(Approved by Secretary of State, and signed in his absence)

Ms Henderson

cc Mr. Pask
PS/SoS
PS/PUSS (Mr. Howe)
PS/PUSS (Mr. Mellor)

Energy

Health & Safety Executive
25 Chapel Street
London NW1 4DT
Telephone 01-262 3277
ext 237

News Release

15 July 1982

EMBARGO:
NOT FOR PUBLICATION, BROADCAST OR USE ON CLUB TAPES BEFORE 11.00 HOURS THURSDAY, 15 JULY 1982. THIS DOCUMENT IS ISSUED IN ADVANCE ON THE STRICT UNDERSTANDING THAT NO APPROACH IS MADE TO ANY ORGANISATION OR PERSON ABOUT ITS CONTENTS BEFORE THE TIME OF PUBLICATION

SIZEWELL PWR: NUMBER OF SAFETY ISSUES STILL TO BE RESOLVED, SAYS NUCLEAR INSTALLATIONS INSPECTORATE

Assessment work on the 'safety case' is at an early stage and a number of safety issues still remain to be resolved before the specific design for a nuclear power station of the pressurised water reactor (PWR) type at Sizewell 'B', Suffolk can be accepted, says a report* published by the Health and Safety Executive today.

But the information so far available to the Executive's Nuclear Installations Inspectorate (NII) suggests that sufficient safeguards could be incorporated into the design to satisfy the NII that a nuclear site licence can be granted. This is in line with the Inspectorate's earlier view published in its generic review** in 1977.

The report, intended primarily to assist the Sizewell 'B' public inquiry+, summarises the position reached by 1 April 1982 in the Inspectorate's assessment of the Central Electricity Generating Board's (CEGB) Pre-Construction Safety Report (PCSR) for a PWR based on the Westinghouse SNUPPS design.

Particular emphasis in the report is placed on those matters of safety principle or of design intent, likely to have significant effect on the main features of plant provision or layout, which need to be settled before the Board's existing licence for Sizewell can be varied to include a new station and consent given to start construction.

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* Sizewell B: A review by HM Nuclear Installations Inspectorate of the Pre-Construction Safety Report, HM Stationery Office or booksellers, price £5.50 plus postage. ISBN 0 11 883652 8.

** PWR: A report by the Health and Safety Executive to the Secretary of State for Energy on a review of the generic safety issues of pressurised water reactors, HM Stationery Office or booksellers, price £4.50p plus postage. ISBN 0 11 883653 6.

\+ The main hearing begins 11 January 1983.

The assessment is part of a continuing process which included the generic review and which, if approval is eventually given, will continue through design, construction, commissioning, operation and decommissioning of the station.

Stringent Standards

In a foreword to the report, Mr Ron Anthony, the Chief Inspector of Nuclear Installations says: "In deciding whether to recommend the issue of a licence for a nuclear installation our aim is to be satisfied that the installation's siting, design, construction and operation will meet the health and safety standards which we have set. These standards are stringent both for the protection of persons on the plant and for those outside who may be affected by an incident on the site".

The report says it is not a general review of the safety of the proposed PWR but aims rather to discuss any shortcomings of the safety case presented in the PCSR and to present the NII's views on the position with regard to the safety issues and the progress being made in dealing with them at this stage in the licensing process. It also describes briefly the history of the project and the NII's safety assessment principles* and criteria which provide a framework and guidance against which judgements on acceptability are made.

"In the review we have been concerned strictly with safety matters and not with the need for additional electricity generating capacity or how this is to be provided", says Mr Anthony.

Safety Need Be No Obstacle

"From the conclusions of the report it is clear that there is no reason to change our view, following the generic review, that there is no fundamental reason for regarding safety as an obstacle to the use of a PWR for a commercial power station. However, before the specific design of Sizewell 'B' can be accepted for licensing there are a number of safety issues still to be resolved". These are discussed in the various chapters (which follow closely the layout of the PCSR) and summarised in section 19. An indication of the further work that will be necessary and the further information to be provided before the NII can be satisfied, is also given.

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* Nuclear Safety: HM Nuclear Installations Inspectorate - Safety Assessment Principles for Nuclear Power Reactors, HM Stationery Office or booksellers, price £3.00 plus postage. ISBN 0 11 8836420.

The outstanding issues, summarised in more than 25 main conclusions at the end of the report, consist mainly of a number of matters on which further information and analysis is required, but where the NII believes this will show that the necessary standards can be achieved. There are also matters, says Mr Anthony, for which the NII believes some modification to the original proposed design intent may be needed before it can be satisfied and, finally, a few issues where the most appropriate solutions have yet to be determined.

Among the key areas of concern to the NII, says the report, are the adequacy of the case made against hazards such as fire, aircraft crash or earthquakes; the behaviour of the fuel cladding in certain fault conditions; the case made for dealing with the problems of the steam generator tubes; and the behaviour of the plant following possible failure of the shut-down control rods. In a number of other important areas, such as the integrity of the pressure vessel and the use of microprocessor technology for reactor protection, the Inspectorate is now satisfied in principle that a case can be made, though more work needs to be done to demonstrate an acceptable case.

Licensing: A Continuous Process

In considering the NII's views and conclusions reached, says the report, it should be borne in mind that the pre-licensing process involves a dialogue between the licence applicant and the Inspectorate which, in the normal course of events would extend over some two or more years. This process has been temporarily suspended at an early stage in the Inspectorate's assessment work so as to provide a review of the position for the public inquiry.

Both during and since preparation of the report the process has taken place and will continue with further development and improvements of the design and the safety case as a result of both internal appraisal and re-appraisal by the industry and CEGB, and also discussion with the Inspectorate of the case presented and the safety issues.

Only if the NII is sufficiently satisfied with the case will the Health and Safety Executive be advised that the Sizewell 'B' station can be licensed, the report adds.

NOTE TO EDITORS:

General background information on the role of the Nuclear Installations Inspectorate in relation to the licensing of nuclear power stations and the responsibilities of licensees are given in an appendix to this press release.

E38:82

BACKGROUND INFORMATION

Role of the Nuclear Installations Inspectorate

In the United Kingdom, if a generating board wishes to install and operate a power station it must first obtain planning consent from the appropriate Minister under the Electric Lighting Act of 1909. If the proposed station is to be a nuclear power station the board must also obtain a licence from the Health and Safety Executive under the Health and Safety at Work Act 1974 and the associated relevant statutory provisions of the Nuclear Installations Act 1965. The Nuclear Installations Inspectorate (NII) is that part of the Executive which carries out its nuclear site licensing and regulatory function under the relevant Acts.

Assessment of the safety of a proposed reactor or other nuclear installation is a continuous process from design inception, through detailed design, construction, commissioning, operation and ultimately decommissioning. The process starts with an appraisal by the NII of preliminary information about the likely design of the plant and of generic information about similar plants. There follows a more formal stage which involves examination by the Inspectorate of safety reports and supporting documents presented by the prospective licensee. This examination continues throughout the period of design to the issue of a nuclear site licence, followed by a Consent, required under the conditions attached to the licence, to start construction. This Consent is not given unless the Inspectorate is satisfied with the licensee's safety case on the main features of the plant and its layout. Detailed design work on these main features and the remainder of the plant will still be in hand and the Inspectorate will need to be satisfied at each stage before Consents to proceed are given, including Consent to load fuel into the reactor and to the various stages of commissioning. Details of operational and maintenance procedures are also examined during this period, leading in due course to Consent being given to full commercial operation of the plant. Finally there is review throughout the life of the plant of operational procedures and of any plant modifications. The licensing process also permits the attachment of new licence conditions providing for additional controls at any stage and, in the ultimate, withdrawal of the licence itself.

Appendix ii

Responsibilities of the Licensee

Under the relevant legislation it is the licensee's responsibility to achieve and demonstrate an adequate standard of safety for his plant. There is also a duty on the licensee to reduce hazards to plant staff and other persons (including the public) so far as reasonably practicable, that is, not merely to meet standards or criteria but to do better if he reasonably can. In addition, the licensee must use the best practicable means against the release of noxious substances.

It is the Inspectorate's responsibility to assure itself and so the Health and Safety Executive on the soundness of the licensee's safety case and the suitability of his proposed installation for licensing and eventual operation. The Inspectorate obtains its assurance by monitoring the licensee's design procedures and the construction of the plant, by checks on the licensee's safety case against established safety criteria and standards which are themselves continuously developing, and by checks to ensure that the licensee is doing all that is reasonably practicable to minimise the hazards. The Inspectorate's safety assessment is, therefore, a continuous process involving discussions with the licensee over a long period supported by inspection and audit of the licensee's activities from design through to eventual decommissioning.

CONFIDENTIAL

Prime Minister

Questions tomorrow?

MCS 14/7

SECRETARY OF STATE FOR ENERGY
THAMES HOUSE SOUTH
MILLBANK LONDON SW1P 4QJ
01 211 6402

Michael Scholar Esq
10 Downing St
London SW1

14 July 1982

Dear Michael,

SIZEWELL PWR INQUIRY

I wrote to you on 1 July explaining that the Nuclear Installations Inspectorate safety review for the Sizewell PWR would be published on 15 ~~January~~ July. I also gave the impression about the content of the review which we had obtained from early drafts.

I am now enclosing a copy of the report itself (which is embargoed until 11.00 am on 15 July) and a copy of the NII's press notice which will accompany it.

You may like to have our more considered impression of the review. There are five major points of NII concern which are highlighted in paragraph 19.5. It is helpful that on two particularly important issues (the pressure vessel and the protection system) the NII say they are satisfied in principle that the case can be made although more work needs to be done to demonstrate an acceptable case.

However there are numerous relatively minor issues on which the review expresses reservations, which arise more due to the early stage of the NII's consideration of the safety case, than due to any doubts that they will be resolved with time. These reservations may attract attention out of proportion to their importance. We can therefore expect to see some alarmist comments on the review.

To meet such comment we will be concentrating attention on the broadly helpful remarks in paragraph 1.7 ie that it is clear that there is no fundamental reason for regarding safety as an obstacle to the use of a PWR for a commercial power station. We shall also underline the fact that the NII's assessment is a continuous

process right through to the operation of the plant. Paragraphs 2.18 and 19.1 of the review indicate that, given the comparatively early stage in the licensing process at which the review has been written, it is to be expected that there would still be many reservations and concerns.

You may also like to know that Sir Walter Marshall has told the Dept that in his opinion the review was an acceptable basis for proceeding with the Inquiry, that the criticisms in it could be turned to advantage by demonstrating the NII's independence, and that he is confident the CEGB can show, between now and the start of the Inquiry, that all the significant criticisms can be met.

Yours ever,

JULIAN WEST
Private Secretary

Energy

Prime Minister (2)

A fortnight late.

MLS 1/7

SECRETARY OF STATE FOR ENERGY
THAMES HOUSE SOUTH
MILLBANK LONDON SW1P 4QJ
01 211 6402

Michael Scholar Esq
Private Secretary to the
Prime Minister
10 Downing Street
London
SW1

1 July 1982

Dear Michael,

SIZEWELL PWR INQUIRY

We spoke earlier this week about the review of safety issues which the Nuclear Installations Inspectorate are planning to publish for the Sizewell Inquiry.

As I explained, the NII's original plan was to publish their review at the end of June. However some slippage occurred earlier in the year in the finalisation of CEGB's safety case for the Inquiry. As a result the NII's work was also affected. However their Chief Inspector has now confirmed to officials here that (provided that problems on the railways do not delay printing and proof-reading) the review should be published on 15 July.

My Secretary of State is concerned about this slippage. However, with the main inquiry hearing due to start on 11 January 1983, the time available for public scrutiny of the NII review will be only four days short of the six months he had originally envisaged. On this basis there seems no case for seeking to delay the main hearing.

I understand that the review will show a better position in regard to the major safety issues than was forecast by the PWR Task Force last autumn, and will confirm that there is no fundamental reason why a PWR should not be licensed for commercial electricity generation at Sizewell. However, it will identify the need for some further information and indicate that the NII are not yet convinced of the safety case to the point where the licence could be issued. Given the continuous nature of the licensing process the NII could not be expected to do more at this stage and it will be important to ensure that objectors understand this. The CEGB will make a major effort to ensure that as many as possible of the NII's remaining reservation are resolved before the inquiry begins.

Yours ever,

JULIAN WEST
Private Secretary

BK

File Energy

CF
Do you want to
keep this?
JD 13/5

12 May 1982

PROPOSED SIZEWELL B
NUCLEAR POWER STATION

I am writing on behalf of the Prime Minister to thank you for your letter of 12 May, with which you enclosed a leaflet outliningkthe CEGB's case for Sizewell B.

I know that the Prime Minister will be very interested to see this, and grateful to you for sending it.

MICHAEL SCHOLAR

John Baker, Esq.

MC

CENTRAL ELECTRICITY GENERATING BOARD

Sudbury House, 15 Newgate Street, London EC1A 7AU Telephone 01-248 1202 Ext 2838

From: John Baker
Board Member

12 May 1982

R12

Rt Hon Margaret Thatcher, MP
House of Commons
London
SW1A 0AA

Dear Prime Minister

PROPOSED SIZEWELL B NUCLEAR POWER STATION

You will know generally about my Board's proposal to build the first British PWR nuclear power station at Sizewell in Suffolk alongside the existing power station. We published today the main documentation in support of our application to the Secretary of State for Energy for consent to build the station, to be known as Sizewell B. The public inquiry into the proposal opens in January 1983 at Aldeburgh.

The documentation is substantial - it weighs about two and a half hundredweight - and will be available for public inspection at a number of locations. A copy of one of the principal documents, the Board's Statement of Case, is being lodged in the House of Commons Library.

I thought you might like to have the attached leaflet outlining our case for Sizewell B. We have also prepared a somewhat longer summary of the case, and if you would like a copy perhaps you would let me know. And if there is any further briefing you would like on the Board's business, do please get in touch.

Yours sincerely

John Baker.

Since this is an important plank of Government energy policy, this letter has gone widely to MPs — I felt you might like to be aware of what we have said.
Best wishes in these difficult times.

These documents will consist of the following:

(a) the Board's statement of submissions (Statement of Case) which it proposes to put forward at the Inquiry

(b) the Reference Design

(c) the Pre-Construction Safety Report (PCSR)

(d) some 300 documents in support of the PCSR

The five locations mentioned above are in compliance with the 1981 Rules and are the formal locations where the public may go and inspect the documents. In addition, the Statement of Case, the PCSR and the Reference Design can be seen by the public at:

CEGB–South Eastern Region
Bankside House
Sumner Street
London
SE1 9JU

CEGB–South Western Region
Bedminster Down
Bridgwater Road
Bristol
BS13 8AN

CEGB–Midlands Region
Haslucks Green Road
Shirley
Solihull
West Midlands
B90 4PD

CEGB–North Eastern Region
Beckwith Knowle
Otley Road
Harrogate
HG3 1PS

CEGB–North Western Region
Europa House
Bird Hall Lane
Cheadle Heath
Stockport
SK3 0XA

Cornwall County Council
County Hall
Truro
TR1 3AY

Dorset County Council
County Hall
Dorchester
Dorset
DT1 1XJ

Gwent County Council
County Hall
Cwmbran
NP4 2XH

Northumberland County Council
County Hall
Morpeth
Northumberland
NE61 2EF

South of Scotland Electricity Board
Cathcart House
Spean Street
Glasgow
G44 4BE

Northumberland, Dorset, Cornwall and Gwent County Councils have been chosen because there is special interest relating to the development of nuclear power in these areas.

In accordance with the 1981 Rules, every person who is registered as an objector to the Sizewell B proposal with the Department of Energy will receive a letter advising them of where the documentation can be seen.

The PCSR and Reference Design will be issued on a limited basis to those groups who wish to address safety issues at the Public Inquiry.

A charge will normally be made if more than one copy is requested. A charge will also be made to individuals, institutions or other organisations who merely wish to have a set for interest rather than for use at the Public Inquiry. Requests for copies of the documentation should be addressed in writing to:

Mr. R. S. Lyman
Senior Assistant Consents Officer
Central Electricity Generating Board
Sudbury House – Room 586
15 Newgate Street
London
EC1A 7AU

Published by:

Central Electricity Generating Board
Press and Publicity Office
Sudbury House
15 Newgate Street
London EC1A 7AU

G1046 May 1982

A guide to.....

The Case For SIZEWELL B Nuclear Power Station

Central Electricity Generating Board
May 1982

In one of the biggest public information exercises of its kind, the Central Electricity Generating Board has published its case for building a British Pressurised Water Reactor (PWR) nuclear power station at Sizewell in Suffolk – Sizewell B.

Documents weighing about two and a half hundredweight support the Board's case that the British PWR would be a safe and sound investment, and meet a real need.

The Board also recognises, however, the crucial importance of public acceptability for the project, and that this must be won in full and open debate.

This leaflet explains why the Board wants to build Sizewell B. It outlines the key arguments that will be put forward at next year's Public Inquiry to demonstrate the validity of building a PWR at Sizewell. The station would have an output capability of some 1,100 megawatts of electricity – enough to meet the needs of most of the population of East Anglia – and be sited next to the existing Sizewell A Magnox nuclear power station.

The case for Sizewell B rests on the conviction that:

- The Board has a good, safe and economic design for the PWR
- The PWR would help keep the cost of electricity as low as possible. It would have lower total costs than a new coal, oil or Advanced Gas Cooled Reactor (AGR) nuclear station, and would more than pay for itself over its lifetime from fuel saving alone
- The PWR would help improve the security of fuel supplies by further diversifying the types and sources of fuel used for electricity generation at a time when the price of oil requires its minimum use and the Board is over-reliant on coal
- It makes good sense to build the PWR now to reap the earliest benefit from displacing older, less economic plant
- Since the CEGB's step-by-step approach to future development seems likely eventually to lead to the ordering of further nuclear capacity, the Board must ensure that it has available the best technology, and it is therefore necessary to establish the PWR as an alternative in the UK to the AGR.

The questions the Board has to answer. . .

In proposing to build Sizewell B, the Board has to answer a sequence of fundamental questions – questions that have to be considered against the background of the 50-year time span of the construction and operational life of the station. The answers are provided in the volumes of documentation that will be presented to the Public Inquiry.

The following is a thumb-nail sketch of those answers.

How do you justify building a new power station now?

A new station can be justified if it reduces total costs. That is what Sizewell B is planned to do. Even though there is no immediate need for a new station – unless there is an upsurge in electricity demand – new stations are likely to be ordered for capacity purposes later in the 80s. Not only would they be needed to provide for any possible increase in electricity demand but also, in particular, to replace existing power stations as they become obsolete and uneconomic. Some 3,400 megawatts of existing nuclear capacity – the Magnox stations – are likely to be retired in the 90s just when Sizewell B would come into operation.

With more than 80 per cent of electricity currently being produced by coal-fired stations, electricity consumers are highly dependent on the price and availability of this one fuel. There is a need for a better balance in generating capacity to insure against any excessive increase in the costs of coal or longer term shortage.

Will nuclear power reduce costs?

On present experience, in America, in Europe and in many other countries besides the UK, nuclear power produces low cost electricity; and in almost every likely circumstance, the Board can show that the total costs of nuclear power will continue to be less than those of new coal-fired stations, and also less than the fuel costs alone of oil and old coal stations.

This is because there is every indication that coal and oil prices – by far the biggest factor in electricity price increases – will continue to rise. The gap in running costs between coal and nuclear stations is more than enough to cover the capital costs of a new nuclear station.

Will the PWR be the most economic nuclear station?

After a thorough examination of the cost of all types of advanced nuclear stations currently operating, the Board believes the PWR would prove to be the most economic to build. In doing so, the Board would take advantage of world experience of PWR operation. It is estimated that Sizewell B would cost £1,147 million, compared with £1,590 million for another AGR station. This is equivalent to £1,033 per kilowatt of capacity, compared with £1,293 per kilowatt for the cost of a new AGR station. Some 90 per cent of the cost of the PWR would be spent in Britain.

In forecasting costs over the lifetime of a station that is not likely to cease generation much before the year 2[illegible] many changing factors have to be considered. Among the most significant of these are changes in fossil and nuclear fuel prices and the likely demand for electricity.

For these reasons the Board has examined a variety of assumptions, ranging from a combination of unfavourable ones to those which are favourable in all aspects, with central assumptions carefully chosen to be neither unduly pessimistic nor over optimistic.

Even on the assumption of low economic growth, a PWR would help to hold down the cost of generating electricity. By not building it, the chance for electricity consumers to save between £500-£1,000 million over the station's lifetime would be lost. To build an alternative new coal-fired station of similar capacity would cost consumers between £100-£200 million extra.

Will the PWR be safe?

The Board is confident that the British PWR will fully satisfy the rigorous UK nuclear safety requirements because:

The Sizewell PWR would be designed to the Board's own high safety standards – the same degree of nuclear safety would be imposed that has given the UK the benefit of 260 reactor years of nuclear power station operation without evidence of harm to anyone from radiation.

Additional safety-related systems would be added to those already contained in the standardised design developed by leading American firms, Westinghouse and Bechtel, to meet UK requirements. These include provision of a larger containment building, and secondary containment, improved radiation shielding for station staff and an improved emergency core cooling system.

On safety issues, the CEGB has to satisfy the independent Nuclear Installations Inspectorate – without whose permission the Board would not be allowed to build or operate the PWR.

Why build the PWR at Sizewell?

There are three main reasons why Sizewell on the Suffolk coast was selected for the PWR: it is in the right place for helping to balance electricity supply and demand in the south east, no new transmission lines would be needed, and the Board owns the site. In addition, the use of seawater for cooling purposes means that no cooling towers would be required.

Conclusions

The proposal to build Sizewell B is the culmination of:

In-depth studies into the relative economic costs of a PWR compared with other generating plant

Extensive research into a wide range of possible trends in future national economic growth and the effects each would have on electricity demand and future energy prices

Detailed work to ensure that the British PWR design would meet safety standards in this country.

The conclusions reached from these studies demonstrate convincingly that the PWR system would meet a very real need, and that the Board can approach the forthcoming Public Inquiry in the confidence that:

- it has a design, adapted to meet British conditions, which would be both economic and suitable for subsequent replication
- the design is capable of meeting stringent nuclear safety requirements
- the construction of Sizewell B nuclear power station would be a sound investment for electricity consumers, and would be to the economic advantage of this country.

Documentation

A set of documentation for the PWR Public Inquiry is available for public inspection in accordance with Rule 5(2) of the Electricity Generating Stations and Overhead Lines (Inquiries Procedure) Rules 1981 at the following locations:

CEGB Headquarters
15 Newgate Street
London
EC1A 7AU
(Sizewell B Information Centre, Paternoster Square)

Nuclear Information Centre
Sizewell B Site
Near Leiston
Suffolk
IP16 4UE

Suffolk Coastal District Council
Council Offices
Melton Hill
Woodbridge
Suffolk

Suffolk County Council
St. Edmund House
Rope Walk
Ipswich
IP4 1L2

Sizewell B Information Office
47 High Street
Leiston
Suffolk

CONFIDENTIAL

R M

Energy

10 May, 1982

NORTH SEA OIL EXPORTS GUIDELINES

The Prime Minister has seen the minute of 7 May by the Foreign and Commonwealth Secretary. She is content with the recommendations in paragraph 6.

I am copying this letter to Julian West (Department of Energy).

A J COLES

F Richards, Esq
Foreign and Commonwealth Office

CONFIDENTIAL

010/

(1)

Prime Minister

Content with para. 6?

Yes MG

A.J.C. 7/5.

PM/82/35

PRIME MINISTER

North Sea Oil Exports Guidelines

1. When Peter Carrington visited Israel last month, Mr Begin again raised the question of North Sea oil sales to Israel, referring to an indication which he said he had been given by Mr Callaghan that this might be possible once our production reached a certain level. Peter Carrington said that in spite of the current oil glut it would be unfair to commit supplies to Israel, at the eventual expense of our regular customers in the IEA and the EC. He nonetheless undertook to mention the question to you.

2. The Government guidelines on the sale of oil as stated by Ministers in Parliament (and which have no legal force) provide that crude oil from the UK Continental Shelf (UKCS) should be exported to International Energy Agency (IEA) and EC member countries, or other countries with which there is an established pattern of trade in oil. They are an expression of solidarity over resources with our Community and IEA partners and the answer to suggestions that we should be doing more to share our oil with the Community. They make it easier to reject requests for UKCS oil from countries, eg Israel or South Africa, where this might provoke hostile reactions from elsewhere, without our seeming to discriminate against specific countries.

3. No OPEC country will supply Israel, which obtains its oil from Mexico, Egypt and the spot market. The US has agreed to make up Israel's oil supplies in an emergency.

/4.

4. Agreement to Begin's request would almost certainly lead to a row with OPEC. Accusations have recently been made within the Organisation that Britain is trying to undermine OPEC through manipulation of North Sea oil prices. This is of course nonsense, as we have made clear. Nevertheless, the sale of oil to Israel might be seen by OPEC as highly provocative and could have repercussions for our trade with the Arab world. In view of the relatively small quantities of oil which would be involved if we supplied Israel, I judge that it is not worth taking this risk.

5. I have considered as an alternative encouraging the Israelis to pursue the conclusion of oil swap dealings with British oil producers. But a policy of permitting swaps but not sales would be more difficult to defend domestically and might be just as objectionable to OPEC.

6. I therefore recommend that we make no attempt to modify the guidelines. I would not propose to go back to Mr Begin (he told Peter Carrington that this was not a burning issue). If the Isrealis raise the matter again, we can say that having reviewed the position we have concluded that we cannot offer them the security of supply they seek at the expense of our IEA and EC partners. If pressed, we could add that short-term contracts would be of no economic interest to them and that long-term contracts would impinge on the position of our energy partners regardless of present market conditions. We can also point out that our willingness to help meet Israeli energy needs is demonstrated by the NCB's current contract to export coal to them.

7. I am copying this minute to Nigel Lawson.

7 May 1982

(FRANCIS PYM)

Foreign and Commonwealth Office

CONFIDENTIAL file RSC

Energy

10 DOWNING STREET

From the Private Secretary

5 April 1982

Export of North Sea Oil

Thank you for your letter of 30 March. The Prime Minister has noted its contents.

I am copying this letter to Julian West (Department of Energy) and to David Wright (Cabinet Office).

A. J. COLES

Michael Arthur, Esq.,
Lord Privy Seal's Office

CONFIDENTIAL

CONFIDENTIAL

SECRETARY OF STATE FOR ENERGY
THAMES HOUSE SOUTH
MILLBANK LONDON SW1P 4QJ

01 211 6402

N.S.D.S.

AAR 5/4

M.A.

John Coles Esq
Private Secretary
10 Downing Street
London
SW1

2 April 1982

Dear John,

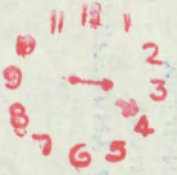
Michael Arthur sent me a copy of his letter of 30 March about exports of oil to Israel.

You will be glad to hear that the subpoena on my Secretary of State, to which he refers, was set aside in the Courts yesterday. It remains possible that one of the parties will attempt a further subpoena later on in the proceedings.

I am copying this letter to David Wright.

Yours ever,

J D WEST
Private Secretary



CONFIDENTIAL

Prime Minister

To be aware.

A.J.C. 31/3

(2)

Foreign and Commonwealth Office

London SW1A 2AH

30 March 1982

Dear John

The Prime Minister may wish to be aware that arbitration proceedings were due to start in London on 29 March which may bring a challenge to the Government's policies on the export of North Sea oil as expressed in the so-called sales guidelines. It has a direct bearing on sales of oil to Israel and this could be raised during the current visit there by the Foreign and Commonwealth Secretary. The case also raises the question of whether the guidelines are compatible with the Treaty of Rome.

The Government guidelines, first announced in 1979 by the last administration and frequently repeated by Ministers in Parliament since, are that crude oil from the UK Continental Shelf (UKCS) should be exported to International Energy Agency (IEA) and EC member countries, or other countries with which there is an established pattern of trade in oil. The guidelines have no legal force, but have facilitated the rejection of requests for UKCS oil from countries, eg Israel or South Africa, where this might provoke hostile reactions from elsewhere, without our seeming to discriminate against specific countries. They are worth maintaining for this reason and because they are also a very valuable expression of solidarity with our IEA and Community partners. The guidelines do not cover trade in oil products or other forms of energy.

An American company, Sun Oil, basing itself on the guidelines, has refused to fulfil a contract to sell a cargo of UKCS crude to Bulk Oil (a company with extensive Jewish links) because the nominated destination was Haifa. Bulk Oil has commenced aribtration proceedings against Sun Oil and is expressly arguing that the guidelines infringe EC legal requirements.

HMG are not a party to the proceedings and have no standing to intervene. Solicitors for both parties have been in touch with the Department of Energy on various aspects of the case, but we do not have direct or full knowledge of all the facts of the arbitration. The Secretary of State for Energy, however, has been subpoenaed to appear at the hearing and will be represented by an official. A Cabinet Office official sub-committee responsible for Community legal questions is studying the possible EC legal risks to HMG which may result from the arbitration and will prepare possible action to defend our policies, should this become necessary.

/Israel's

A J Coles Esq
PS/No 10

CONFIDENTIAL

Israel's oil supply is adequately secured by a contract with Mexico and, since the handback of the Sinai oil fields, with Egypt. Her remaining requirements are met by purchases, often on the spot market. She also has a treaty commitment from the US to make up oil supplies in an emergency. Nonetheless, since 1979, the Israelis have raised with us on a number of occasions the possibility of obtaining supplies of UKCS crude and have alleged that the guidelines are contrary to the EC-Israel Agreement.

Given the earlier Israeli approaches over the guidelines and Bulk Oil's Jewish links, it is possible that the Israelis may have been instrumental in causing the proceedings to be brought. In present circumstances they have no economic interest in buying UKCS oil. If they are pushing Bulk Oil's case, it can only be to make a political point or embarrass us. It is unfortunate that the way in which Bulk Oil have chosen to argue their case draws attention to aspects of our UKCS policies which risk being held incompatible with our EC obligations (though given the value of the guidelines to the EC in overall political and economic terms, it remains to be seen what the reaction of the Community institutions would be to this proposition). If the matter were ever to reach the European Court we would not rule out the possibility of the Commission giving evidence in support of the guidelines in view of the contribution they make to secure Community energy supplies.

I am sending a copy of this letter to Julian West at the Department of Energy and to David Wright.

Yours ever

Mustard Arthur

M A Arthur
PS/Lord Privy Seal


30 MAR 1982
BOSTON

Prime Minister

MES 23/3

2 MARSHAM STREET
LONDON SW1P 3EB

My ref:

Your ref:

27 March 1982

Thank you for your letter of 26 January on the Sizewell public inquiry and the question of aid for objectors.

I entirely agree with your conclusion that we should not grant aid to objectors at Sizewell. However, we run the risk of some embarrassment if we are upstaged by a decision of the CEGB to give aid from their own funds, and I hope therefore you will be able to dissuade them from making any such offer. This would I think be seen as a most unfortunate precept against our traditional policy on this matter.

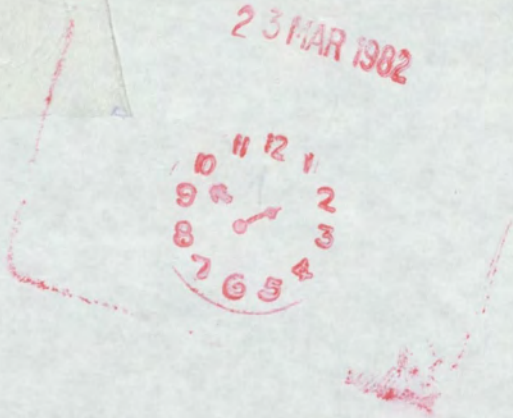
I am copying this letter to the recipients of yours.

Yours ever

MICHAEL HESELTINE

The Rt Hon Nigel Lawson

RESTRICTED


23 MAR 1982

CONFIDENTIAL

Energy
Prime Minister (2)

BI
MAP

PLS 2572

SECRETARY OF STATE FOR ENERGY
THAMES HOUSE SOUTH
MILLBANK LONDON SW1P 4QJ
01 211 6402

Rt Hon Sir Geoffrey Howe QC MP
Chancellor of the Exchequer
Treasury Chambers
Parliament Street
London
SW1

24 February 1982

OIL DEPLETION POLICY: PRODUCTION CUTS

I am grateful for the agreement in your letter of 17 February to my announcing the decision on production cuts in the week before the Budget. I am arranging to make the announcement by a Written Parliamentary Answer on 2 March. The text will be as in the draft with my letter of 15 February.

Patrick Jenkin argued in his letter of 11 February against a commitment not to impose production cuts before the end of 1984. I hope he will not press this point. All my contacts with the oil companies convince me that the commitment I propose is important to maintain their confidence in the North Sea. And the effect of production cuts on the exchange rate is so uncertain - paragraphs 26-27 of the Working Group report show that officials do not even know in which direction they would work - that we gain nothing by retaining this highly theoretical option.

I am sending copies of this letter to the Prime Minister, Peter Carrington, George Younger, Patrick Jenkin, Michael Havers and Sir Robert Armstrong.

NIGEL LAWSON

AD
AW

Energy

(2)

Prime Minister

TUS 15/2

SECRETARY OF STATE FOR ENERGY
THAMES HOUSE SOUTH
MILLBANK LONDON SW1P 4QJ

01 211 6402

CONFIDENTIAL

Rt Hon Sir Geoffrey Howe QC MP
Chancellor of the Exchequer
Treasury Chambers
Parliament Street
LONDON SW1

15 February 1982

Dear Chancellor,

OIL DEPLETION POLICY: PRODUCTION CUTS

In your minute to the Prime Minister of 27 January agreeing with my conclusion that we should not impose cuts, you said there might be advantage in making this announcement and that on North Sea tax together, ie at the time of the Budget.

Now that the Prime Minister has agreed that an announcement be made, let us by all means discuss the question of timing as you proposed. But I must tell you that I do not think handling this matter in the way you suggest would be either politic or timely.

An earlier announcement on cuts - and the sooner it comes, the better - would gain us maximum credit with the companies and cause them to take a less hostile view of a later announcement on the limited tax concessions which we have in view. By contrast an announcement on cuts in the Budget package itself would be overshadowed by the rest of the Budget and would lose impact with the companies. But there is a more fundamental objection to the course you propose. Production cuts are neither a taxation nor an expenditure decision, and are thus in no sense a budgetary matter. The inevitable result of linking the two issues would be to strengthen the views of those who believe we are using the tax regime as a back door depletion instrument.

I enclose a copy of the Written Answer I have in mind.

I am sending copies of this letter to the Prime Minister, Peter Carrington, Francis Pym, George Younger, Patrick Jenkin, Michael Havers and Sir Robert Armstrong.

Yours sincerely,

Jonathan Chadwick

NIGEL LAWSON

(Approved by the Secretary of State
and signed in his absence)

CONFIDENTIAL

OIL PRODUCTION CUTS - DRAFT WRITTEN ANSWER

On 23 July 1980, my predecessor announced to the House the Government's general approach to oil depletion policy.

In that statement, however, he left open the question of oil production cutbacks which, under the assurances given to the oil companies by the Rt Hon Member for Chesterfield on 6 December 1974 and honoured by the present Government, started to become available from the beginning of this year. After very careful consideration of all the relevant factors, I have decided not to impose such cutbacks, at least until the end of 1984.

This will allow the oil industry a firmer basis for their further exploration of and investment in the UK Continental Shelf which will help to increase oil supplies in the 1990s and beyond.

But I shall continue to consider the implementation on a case-by-case basis of the other measures announced by my Rt Hon Friend. In particular, I shall continue the policy of ensuring that development of new and existing fields proceeds on the basis of good oilfield practice consistent with optimum oil and gas recovery and that wasteful gas flaring is minimised.


15 FEB 1982

CONFIDENTIAL

10 DOWNING STREET

From the Private Secretary

9 February 1982

Oil Depletion Policy: Production Cuts

Thank you for your letter of 8 February.

The Prime Minister is content to proceed as your Secretary of State proposes.

I am sending copies of this letter to Brian Fall (FCO), John Kerr (HM Treasury), Jonathan Spencer (Department of Industry), Muir Russell (Scottish Office), Jim Nursaw (Law Officers' Department), David Wright (Cabinet Office) and Gerry Spence (CPRS).

MCS

Dr. David Lumley,
Department of Energy.

CONFIDENTIAL

CONFIDENTIAL

SECRETARY OF STATE FOR ENERGY
THAMES HOUSE SOUTH
MILLBANK LONDON SW1P 4QJ
01 211 6402

CC AW
AD

(1)

Prime Minister

Content?

MLS 8/2

Michael Scholar Esq
Private Secretary to
the Prime Minister
10 Downing Street
London
SW1

8 February 1982

Dear Michael

OIL DEPLETION POLICY : OIL PRODUCTION CUTS

Thank you for your letter of 4 February. ? 1/2

My Secretary of State is satisfied that an announcement in inescapable. The oil companies have to be told where they stand and to do this without informing Parliament would provoke a major row. Oil depletion policy is seen as important by Members on both sides of the House. We have said in several Parliamentary replies that a decision on production cuts will be announced as soon as possible. The Select Committee on Energy will shortly be reporting on depletion policy. They, too, have been told that an announcement on production cuts will be made as soon as possible. Mr Lawson would however intend to make the announcement in a Written Answer and to play it generally in a low key.

Mr Lawson is however content to avoid linking the decision to the lifetime of this Parliament and to state instead that it will hold until the end of 1984.

If the Prime Minister is content Mr Lawson will discuss the timing of an announcement with the Chancellor. He believes that it should be made as soon as possible, but will of course circulate a draft to the Prime Minister and other colleagues concerned.

I am copying this letter to the recipients of yours.

Yours ever

David Lumley

DAVID LUMLEY
Private Secretary

Energy cc AD JU

01-405 7641 Ext.

Communications on this subject should be addressed to
THE LEGAL SECRETARY
ATTORNEY GENERAL'S CHAMBERS

ATTORNEY GENERAL'S CHAMBERS,
LAW OFFICERS' DEPARTMENT,
ROYAL COURTS OF JUSTICE,
LONDON, W.C.2.

Dr. David Lumley,
Department of Energy,
Thames House South,
Millbank,
London SW1.

2 February, 1982.

NRPM
N
4=

Dear David Lumley,

Sizewell PWR Inquiry: Aid for Objectors

The Attorney General has seen a copy of your Secretary of State's letter of 26 January to the Secretary of State for the Environment.

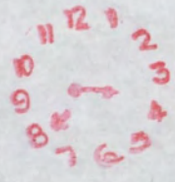
The Attorney General shares your Secretary of State's view that the balance of argument is against granting aid.

I am sending copies of this letter to Michael Scholar (No. 10), John Kerr (H.M. Treasury), David Heyhoe (Lord President's Office), Robert Lowson (M.A.F.F.), Muir Russel (Scottish Office), John Craig (Welsh Office), John Rhodes (Department of Trade), Anthony Mayer (Department of Transport), and David Wright (Cabinet Office).

Yours sincerely,

Gerald Roscoe

G. ROSCOE.



CAD
JU

MINISTRY OF AGRICULTURE, FISHERIES AND FOOD
WHITEHALL PLACE, LONDON SW1A 2HH

From the Minister

NBPM

MIS 2/2

The Rt Hon Nigel Lawson MP
Secretary of State for Energy
Thames House South
Millbank
London
SW1P 4QJ

2 February 1982

SIZEWELL PWR INQUIRY: AID FOR OBJECTORS

Thank you for sending me a copy of your letter of 26 January to Michael Heseltine about granting aid to objectors in the Sizewell Inquiry. I have also noted the Prime Minister's comments in Michael Scholar's letter of 27 January.

I share your view that financial aid should not be granted to these objectors.

I am copying this letter to the Prime Minister, Geoffrey Howe, Francis Pym, Michael Heseltine, George Younger, Nicholas Edwards, John Biffen, David Howell, Michael Havers and Sir Robert Armstrong.

PETER WALKER

file VB.
bc Walters
Duguid.

Energy Policy PX

10 DOWNING STREET

From the Private Secretary

1 February 1982

OIL DEPLETION POLICY: PRODUCTION CUTS

The Prime Minister was grateful for your Secretary of State's minute of 20 January, proposing an announcement that the Government has decided against imposing production cuts from UKCS oil fields. She has also seen minutes dated 27 January by the Chancellor, Foreign Secretary and Robin Ibbs on the same subject.

The Prime Minister agrees with the conclusion against the imposition of production cuts but she doubts whether an announcement should be linked to the lifetime of this Parliament, as proposed in paragraph 8 of your Secretary of State's minute. She has asked whether it would be possible to announce the decision as being one for the next two or three years; she has also asked whether it is inescapable that an announcement has to be made.

I am sending copies of this letter to Brian Fall (FCO), John Kerr (HM Treasury), Jonathan Spencer (Department of Industry), Muir Russell (Scottish Office), Jim Nursaw (Law Officers' Department), David Wright (Cabinet Office) and Gerry Spence (CPRS).

MCS

J.D. West, Esq.,
Department of Energy.

VB

cc Press

2.

Prime Minister

1/2

SECRETARY OF STATE FOR ENERGY
THAMES HOUSE SOUTH
MILLBANK LONDON SW1P 4QJ
01 211 6402

Mike Pattison Esq
10 Downing Street
LONDON SW1

1 February 1982

Dear Mike,

You should know that the CEGB are announcing at 10.30 am tomorrow, that they are not proceeding for geological reasons, with two potential power station sites in Cornwall. These sites (Gwithian near Hayle and Nancekuke near Portreath) are among five the Board announced they were investigating in February 1980. The purpose of a new station in the South West would be to safeguard supplies to the area (much of which are presently imported via the grid) and minimise the need for new transmission lines.

I attach a copy of the Board's statement. The three sites on which investigations are continuing include that at Luxulyan near St Austell. This was recently the subject of legal proceedings following actions by objectors to block CEGB access to the site.

Should the statement be raised during Prime Minister's questions tomorrow the line to take would be that investigation of possible power station sites is the responsibility of the CEGB but that the Board cannot construct a power station on any site without first obtaining the consent of the Secretary of State for Energy. He may order a Public Inquiry where appropriate.

Yours sincerely,

Janet

JANET CHADWICK
Private Secretary

PR 744
2 February 1982

South West Power Station Studies

Progress Report - Two Sites Ruled Out

In February 1980, the Central Electricity Generating Board announced its intention to investigate five locations in Cornwall and Dorset to assess their suitability as sites for a nuclear power station. It gave an undertaking that if any site was found to be unsuitable during the course of the investigations an announcement would be made.

From the work carried out so far it is clear that because of unsatisfactory geological conditions the Cornish sites at Gwithian, near Hayle, and Nancekuke, near Portreath, cannot be considered for future power stations. The Board therefore has no further interest in these two sites.

The assessment of the other three sites at Luxulyan, near St. Austell in Cornwall, Herbury, near Weymouth, and Winfrith in Dorset is continuing and no decision on their suitability for development has been reached. In addition to these assessments, the Board is examining the potential of its Hinkley Point site in North Somerset for further development. Currently, two nuclear stations are in operation on this site.

m.f.

The Board is also continuing to re-assess its site at Inswork Point near Plymouth, for a coal-fired power station, and the redevelopment potential of existing power stations at East Yelland, near Barnstaple, Plymouth and Poole. The further work to be completed covers siting arrangements, costs and economics, environmental considerations and detailed studies of the electricity supply system, and the outcome of all the remaining assessments will be announced as soon as possible.

As a result of the investigations it is hoped to select a site for a nuclear or coal-fired power station which would safeguard electricity supplies in the South West peninsula while keeping to a minimum the need for new transmission lines.

- End -

CENTRAL ELECTRICITY GENERATING BOARD

South-West Investigations for Future Power Station Sites

Background Note

1. In February 1980 the Board announced the start of an investigation of five locations in Cornwall and Dorset to assess their suitability as sites for a nuclear power station. The locations are:

In Cornwall: Gwithian, near Hayle
Nancekuke, near Portreath
Luxulyan, north of St. Austell

In Dorset: Herbury, near Weymouth
Winfrith Heath

2. A re-assessment is also being made of the site at Inswork Point near Plymouth, originally acquired for an oil fired station, as a site for a coal fired plant.

3. From these studies it is hoped to select a site for a nuclear or coal fired power station which would safeguard electricity supplies in the South West whilst keeping to a minimum the need for new transmission lines.

4. In addition consideration is being given to the future potential of the sites of the existing small and ageing power stations at East Yelland near Barnstable, Plymouth and Poole.

5. Work at the various locations has been completed and the results are being analysed. The stage has now been reached where it is possible to reject two of the sites in Cornwall, at Gwithian and Nancekuke, on geological grounds. Geological conditions at the other sites are acceptable and further work is continuing on siting arrangements, environmnetal assessments, costs and economics and studies of the electricity supply system.

6. A separate investigation has shown there is the capability for additional nuclear generating capacity at Hinkley Point adjoining the Board's existing power station. However, because of its location on the north Devon coast additional generation at Hinkley Point would not be the best arrangement to secure electricity supplies in the South-West in the future.

7. It must be emphasised that all the remaining sites referred to above are in contention. A further announcement on the outcome of the work will be made as soon as possible, (in 1982).

8. It is useful to note that the recent blackouts in the South-West caused by exceptional weather conditions have to some extent shown the risk of relying entirely on the transmission system. Some of the recent area shutdowns may have been avoided or the effects reduced if there had been additional major generation operating in the area which the Board's current work is seeking to provide. However many factors were involved in the system failures and this point must not be overstated. The very long periods of shutdown were due to extensive storm damage to Area Board distribution lines and this situation would not have been overcome should additional generation have been available.

February 1982.

Yes but I don't like it. I don't like the idea of tying ourselves to the lifetime of this Parliament - can we say for 2 or 3 years? Do we have to make an announcement? Or not

Prime Minister (1)

Please see minutes from the Chancellor, Lord Carrington, Alan Walters; and Nigel Lawson. Do you agree that we should decide against imposing production cuts? And to an announcement on the lines of para 8 of Nigel Lawson's minute?

MLS 29/1

CONFIDENTIAL

Qa 05797

To: MR SCHOLAR

From: J R IBBS

27 January 1982

Oil Depletion Policy: Production Cuts

1. I have seen the Secretary of State for Energy's minute of 20 January and his conclusions that production cuts should not be imposed for the lifetime of this Parliament.

2. The CPRS has consistently been concerned that the short term value to the Treasury of the maximum output of oil has tended to outweigh longer term arguments for the conservation of a valuable resource. It may well be that the balance of argument on this occasion is as the Secretary of State has concluded, but I am uneasy about the weight he attaches to the point covered in paragraph 6(iii) of his minute, namely that production cuts could discourage adequate further investment by the oil industry in the North Sea. I appreciate that the oil industry is likely to argue that depletion controls would be discouraging; it is already very concerned about the North Sea fiscal regime. In practice, however, the only effect of depletion control would be to remove (by deferment) a slice of the immediate excess above UK requirements; I do not believe that the industry (whatever it might say) would really regard such modest depletion policy decisions as reducing the long term attractiveness of North Sea investment.

3. There seems to me therefore to be a danger that this argument has been overstated, and that the balance of overall argument may be finer than the Secretary of State's minute suggests.

4. I am sending a copy of this minute to the Private Secretaries to the Foreign Secretary, the Chancellor of the Exchequer, the Secretaries of State for Energy, Industry and Scotland, the Attorney General, and to Sir Robert Armstrong.

JRI

CONFIDENTIAL

COPY
J.V., A.D., ~~A.W.~~

FCS/82/18
SECRETARY OF STATE FOR ENERGY

Oil Depletion Policy: Production Cuts

1. I welcome the proposal in your minute of 20 January to the Prime Minister that we should not impose oil production cuts in the UK sector of the North Sea for at least the lifetime of this Parliament. Given the interest that there is likely to be in the decision, I assume you would agree that our officials should arrange that Embassies in Community countries be briefed in advance to inform the other Governments as soon as any announcement is made in Parliament.

2. I am sending copies of this minute to the Prime Minister and to the other recipients of yours.

C

(CARRINGTON)

Foreign and Commonwealth Office, SW1
27 January 1982

10 DOWNING STREET

From the Private Secretary

27 January, 1982.

Sizewell PWR Inquiry: Aid for Objectors

The Prime Minister saw a copy of your Secretary of State's letter of 26 January to the Secretary of State for the Environment about the case for and against granting aid to objectors in the Sizewell Inquiry.

The Prime Minister shares your Secretary of State's view that the balance of argument is against granting aid.

I am sending copies of this letter to John Kerr (HM Treasury), David Heyhoe (Lord President's Office), Robert Lowson (Ministry of Agriculture, Fisheries and Food), Muir Russell (Scottish Office), John Craig (Welsh Office), John Rhodes (Department of Trade), Anthony Mayer (Department of Transport), Jim Nursaw (Law Officers' Department), and David Wright (Cabinet Office).

Dr. David Lumley,
Department of Energy.

CONFIDENTIAL

Treasury Chambers, Parliament Street, SW1P 3AG
01-233 3000

PRIME MINISTER

OIL DEPLETION POLICY : PRODUCTION CUTS

Nigel Lawson sent me a copy of his minute of 20 January to you in which he reports his conclusion against the imposition of oil production cuts.

2. I fully support his conclusion. The imposition of cuts in 1982 and 1983, with the substantial increases in the PSBR described in Nigel's minute, would certainly endanger our wider economic objectives, as paragraphs 26-31 of the officials' report rightly emphasise. I too am not much impressed by arguments about increases in the real sterling value of oil if it is left in the ground. It certainly is no part of this Government's philosophy to engage in what would amount to commodity speculation on a massive scale, particularly when the uncertainties involved are so great.

3. I would like to discuss with Nigel the precise timing of the announcement. As he says, production cuts are linked in the oil companies' minds with our decisions on North Sea tax, and there might be advantage in making the announcements together. But this is something that he and I can consider together.

4. I am copying this minute to the Foreign Secretary, the Secretaries of State for Energy, Industry and Scotland, the Attorney General and to Sir Robert Armstrong.

G.H.

27 January 1982

CONFIDENTIAL

cc Mr. Hoskyns
Mr. Duguid
Mr. Vereker

MR. SCHOLAR

OIL DEPLETION POLICY: PRODUCTION CUTS

1. The Secretary of State for Energy's memorandum of 20 January considers the case for production reductions in our oil resources. The objective would be to defer production until the 1990s.

2. During the summer I chaired a seminar where Professor Maurie Adelman, one of the world's leading authorities on the economics of the oil industry, gave a paper on this topic. I believe he produced convincing arguments that we should not defer production at all. The best production rate will be determined by the existing market incentives.

3. I am therefore happy to endorse the proposal of the Secretary of State for Energy.

26 January 1982

ALAN WALTERS

(1)

Prime Minister

Do you agree that there should be no aid?

MLS 26/1

01 211 6402

Yes MT

The Rt Hon Michael Heseltine MP
Secretary of State for the Environment
Department of the Environment
2 Marsham St
London SW1

26 January 1982

Dear Secretary of State

SIZEWELL PWR INQUIRY : AID FOR OBJECTORS

We need to reach an early decision on this question. It was raised by several members when I announced the timing of the Sizewell inquiry on 20 January. Pressure for aid will now build up. There are indeed some strong arguments for giving it. But I believe the balance of argument is against aid and that we should stand firm on that position. I made it clear on 20 January that there were no present plans for Government aid.

The argument for aid is that the success of the nuclear power programme and other major energy developments depends on carrying public opinion both on policy and on the fairness of the procedure by which decisions are reached. We are fortunate to have escaped so far the virulent and violent opposition to nuclear power which there is in the US and in some Continental countries. Public interest will be raised by the Sizewell inquiry which comes against the background of growing debate about nuclear weapons. The inquiry needs to proceed expeditiously without boycott or interruption. There is much sympathy for the view that an inquiry in which public agencies with large resources are arraigned against amateurs who have to raise their funds by voluntary efforts cannot be fair. The Inspectors at the Windscale and Belvoir inquiries, Mr Justice Parker and Mr Michael Mann QC were both sympathetic to the idea of financial aid to the objectors. Granting aid would not win over committed opponents of nuclear power. But it would reduce the risks of disruption and support for the argument that the inquiry was stacked against the objectors. The Sizewell inquiry could perhaps be distinguished from subsequent nuclear inquiries or other major public inquiries on the grounds that a national issue - the acceptability of the PWR - will be tested.

On the other hand, a planning inquiry is not a Court of Justice. It is a procedure to enable an experienced person who can allow for the objectors' problems in presenting their case to make an independent recommendation to a Secretary of State who is answerable to Parliament for his decision. In practice if the precedent of granting aid to objectors is set at Sizewell it is unlikely thereafter to prove possible to refuse aid to objectors in other large planning inquiries. Indeed it could bring pressure for aid at the current Stansted inquiry. The principle once established could well spread to all inquiries on planning applications by public bodies: and there would

also be pressure for financial aid to objectors who took proceedings in the Courts subsequent to the planning inquiry. The result could well be to encourage objections and litigation leading to long delays such as those on some major energy projects in Germany and the USA. Moreover, a ceiling would have to be applied to any Government funds made available. There would be severe practical problems in deciding how those funds should be divided between objectors, defining the purposes to which they might be applied and requiring applicants to demonstrate their seriousness of purpose through their own financial commitment. Dissatisfaction about the allocation of funds could undermine the intended benefit.

If we were to give aid, a possible half-way house would be for us to appoint and pay for Counsel and Solicitors to co-ordinate and present the arguments of those objectors who wished to be so represented. This is open to many of the same objections as direct financial aid and there could also be practical difficulties. Nevertheless, if we wanted to make a gesture, I think this would be the best way of doing so politically.

The position is complicated by the fact that it has become public knowledge that the CEGB have been considering setting up a fund to aid objectors. The Board have not yet taken a decision and the odds are they will decide against. Should they take the contrary view I would want to try and dissuade them since if aid is to be given to objectors it is both appropriate and politically advantageous that it should come from the Government. My legal advisers tell me that it is in any event doubtful whether the CEGB have the powers to give aid to those opposed to the Board carrying out their statutory functions, so this should help them to explain their decision publicly.

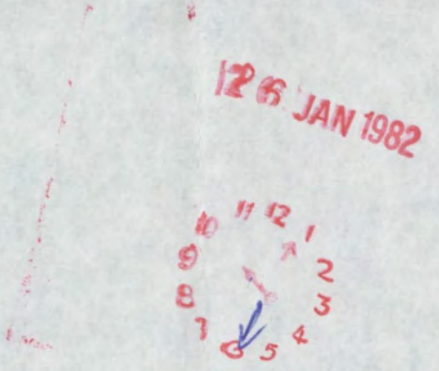
As you said in your letter to David Howell of 3 July last, we will need to stand firm on a concerted response to the request for aid. I should therefore be glad to know if you and our other colleagues concerned share my view that the balance of argument is against granting aid; that the Government should now make this clear and stand firm on that decision; and that if necessary I should seek to discourage the CEGB from granting aid.

I am sending copies of this letter to the Prime Minister, Geoffrey Howe, Francis Pym, Peter Walker, George Younger, Nicholas Edwards, John Biffen, David Howell, Michael Havers and Sir Robert Armstrong.

Yours sincerely

David Lawley

pp NIGEL LAWSON
(Approved by the Secretary of State
and signed in his absence)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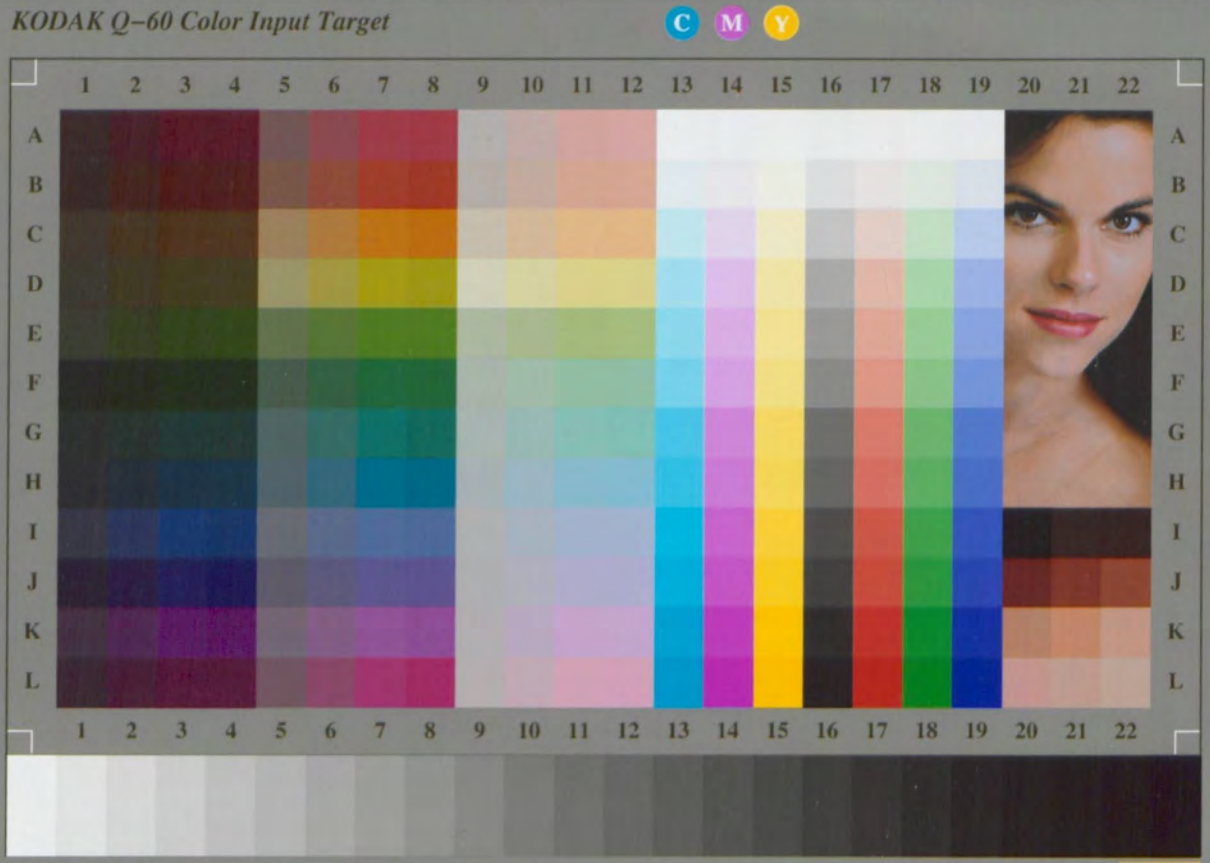
PART 6 ends:-

20.1.82

PART 7 begins:-

26.1.82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