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PART 12

SECRET

CONFIDENTIAL FILING.

Energy Policy

Fast Reactor Policy.

S 3001

ENERGY.

PT 1: May 1979

PT 12: December 1987.

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PART 13 begins:-

~~SS/Engy to PM 3-6~~

D/ENGR to NLW. 1.6.88

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CHIEF SECRETARY TO THE TREASURY

Treasury Chambers, Parliament Street, SW1P 3AG

The Rt Hon Cecil Parkinson MP
Secretary of State for Energy
Department of Energy
Thames House South
Millbank
London
SW1P 4QJ

24 May 1988

Dear Secretary of State,

NATIONAL NUCLEAR CORPORATION

Thank you for your letter at flap of 16 May. I am very pleased by this news.

Bearing in mind GEC's put option, I agree that a price of £14 million subject to contract is a reasonable one for the UKAEA's shareholding in NNC and I look forward to a successful conclusion of your negotiations.

I am copying this letter to the Prime Minister and to David Young.

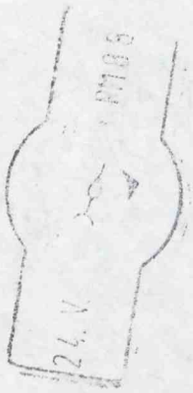
Yours sincerely,

Joe Eddie

pp **JOHN MAJOR**

(Approved by the Chief Secretary and signed in his absence)

ENERGY: Policy Pt 12



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

01 211 6402

The Rt hon John Major MP
Chief Secretary
HM Treasury
Treasury Chambers
Parliament Street
LONDON
SW1P 3AG

16th May 1988

Dear John,

NATIONAL NUCLEAR CORPORATION

I am glad to be able to report good news on the sale of the UKAEA shareholding in the National Nuclear Corporation.

I have spoken to Lord Weinstock to conclude a series of difficult negotiations with GEC and have agreed a price of £14 million for the UKAEA shareholding subject to contract and the over-riding demands of competition policy. The negotiations were carried out against the background that GEC were able and indeed ready to put their shares on us if we could not reach a deal.

Barings have recommended that we accept GEC's offer and I am convinced that it as good a price as we will get. Indeed, the chairman of NEI recently told me he thought a price of £10-12 million would be acceptable for the stake in which NEI are a shareholder. Your letter of 3 March pointed out the additional value to the Government of ending the contingent liability on the UKAEA. All in all I am pleased that we are within sight of ending at an acceptable price the Government's fifteen year involvement with this company.

I should be grateful for your early approval to negotiate and sign a contract for the sale.

I am copying this letter to the Prime Minister and David Young.

Yours ever,
Cecil

CECIL PARKINSON

I.C.V. 50 An 28

forms of transport for exporting any nuclear material overseas. The cost of transporting the material must also be taken into account.

Mr. Darling: To ask the Secretary of State for Energy if he will list the countries which currently send spent Magnox fuel to Sellafield for reprocessing; how much plutonium has been returned to these countries; and how it was transported.

Mr. Michael Spicer: Japan and Italy currently send spent magnox fuel to Sellafield for reprocessing. Some 2½ tonnes of plutonium from the reprocessing of such fuel has been returned to either the country of origin or, on the instructions of its owner, to a third country. The plutonium was transported by air or by sea in accordance with IAEA safety regulations.

Information relating to specific consignments is confidential for reasons of security and commercial sensitivity.

Mr. Matthew Taylor: To ask the Secretary of State for Energy whether plutonium production ability was a factor in the choice of design for the advanced gas-cooled reactors at Hinkley Point in Somerset.

Mr. Michael Spicer: The choice of individual reactor design is a matter for the Central Electricity Generating Board and I have asked the chairman to write to the hon. Member.

Thermal Oxide Fuel

Mr. Darling: To ask the Secretary of State for Energy if he will list the countries currently under contract to send spent thermal oxide fuel to Sellafield for reprocessing in the mid-1990s.

Mr. Michael Spicer: The countries which have thermal oxide reprocessing contracts with British Nuclear Fuels plc which still have to send fuel to Sellafield for reprocessing in the new thermal oxide reprocessing plant are the Netherlands, the Federal Republic of Germany, Switzerland, Italy and Japan. BNFL also has fuel for reprocessing from Canada, Sweden and Spain which has already been delivered.

Air-sea Combat Manoeuvring System

Mr. David Porter: To ask the Secretary of State for Energy if he will make a statement on his assessment of the likely effects on North sea gas and oil installation manufacturing in *(a)* East Anglia and *(b)* the United Kingdom generally, of the air-sea combat manoeuvring system.

Mr. Peter Morrison: I understand that British Aerospace is considering a project which would involve the fabrication of six small towers. United Kingdom fabrication yards should be in a strong position to compete for the work if the project goes ahead.

Power Stations (Comparative Costs)

Mr. Matthew Taylor: To ask the Secretary of State for Energy if he will publish his Department's calculations of the relative costs of a coal-fired station in relation to Sizewell B, referred to in his decision letter of 12 March 1987 on the Central Electricity Generating Board's application to construct Sizewell B; and if he will make a statement.

Mr. Michael Spicer: I have nothing to add to the letter issued by my right hon. Friend on 12 March 1987, which adequately states the grounds for his decision to give consent to the power station at Sizewell B.

AGRs (Refuelling Shutdowns)

Mr. Matthew Taylor: To ask the Secretary of State for Energy on how many occasions on average advanced gas-cooled reactors have to be shut down each year for refuelling; and if he will estimate the cost of these shutdowns.

Mr. Michael Spicer: This is an operational matter for the Central Electricity Generating Board and I have asked the chairman to write to the hon. Member.

Electricity Generation

38. **Mr. Morgan:** To ask the Secretary of State for Energy what minimum proportion of the minimum non-fossil fuel generated electricity in the privately owned electricity industry structure he proposes for England and Wales he envisages will be generated from nuclear stations.

Mr. Parkinson *[pursuant to his reply, 28 March 1988, c. 295-96.]:* As the White Paper on privatising electricity (Cm. 322) made clear, the Government have decided that the obligation will be expressed in terms of a requirement for the distribution companies to contract for a specified minimum proportion of non-fossil fuelled capacity. This will ensure that both nuclear capacity and renewable sources of power will be able to make a contribution to maintaining diversity of fuel sources in the electricity supply system. The distribution companies will be able to seek such capacity from any source, including own generation (within any general limits on this that may be laid down), providing any necessary safety, planning and other consents are obtained. The obligation will set a minimum level of non-fossil fuelled capacity; there will be nothing to prevent distribution companies contracting for or generating companies building a higher level of plant.

It is intended that the requirement will be embodied in an order in the form of a statutory instrument made by the Secretary of State under powers to be sought in the main privatisation legislation. What follows is therefore subject to Parliament approving that legislation.

The Government believe that, in order to give an effective and clear statement of strategic priorities, and to set the background for the series of power station applications submitted and intended to be submitted by the Central Electricity Generating Board (the benefit of which will be transferred to the CEGB's successor companies), it would be right to set the obligation as a level to be obtained in the future. The White Paper made it clear that the proportion of non-fossil fuelled generating capacity required to be under contract would be fixed at a level achievable at the time of privatisation. The precise level is still under consideration. However the Govenent's present intention is that, when it is set, the figure for the year 2000 will not be below the present level of existing and committed nuclear and renewable generating capacity.

Mr KAYACR
cc BG.

10 DOWNING STREET

LONDON SW1A 2AA

From the Principal Private Secretary

13 May 1988

MAKING SCOTLAND A LOW COST POWER PRODUCER AND A MAJOR EXPORTER

IN ATTACHED FOLDER

Allen Sykes of Consolidated Gold Fields sent me the report attached, under cover of his letter of 6 May, containing a proposal for resolving the current difficulties between British Coal and the South of Scotland Electricity Board, for providing Scotland with cheap electricity and for enabling Scotland to become a profitable and efficient major power exporter. As you will see from the last sentence in section two of the paper, on page three, Mr. Sykes calls for involvement at Prime Ministerial level to implement his scheme.

The matters discussed in Mr. Sykes' paper are of considerable importance. But I am unsure whether the Prime Minister would wish herself to become involved in their consideration, let alone in any follow up, in view of the considerable complexities involved. I should, however, like to have a short note on the proposals so that I can brief the Prime Minister about them. Mr. Sykes is an influential man, with wide contacts, and it is not out of the question that the issues discussed in his report might not be raised with her on the floor of the House of Commons during Prime Minister's Questions. I have written to Mr. Sykes (copy attached) to say that I have sent copies of the report to you and to the offices of the Secretary of State for Scotland and the Chief Secretary. But I think that I will need to send him a rather more substantive reply. Please could you let me have a draft.

I recognise that the contents of the paper are of equal interest to the Scottish Office as to your department, and you will of course need to be in touch with them in evaluating his proposals. I should also be grateful if you could involve Greg Bourne of the No. 10 Policy Unit with any interdepartmental consideration of these matters. No doubt the Treasury too would wish to be consulted.

Please could I have a note and draft reply for me to send to Mr. Sykes by Wednesday 1 June.

I am sending copies of this letter to David Crawley (Scottish Office), Jill Rutter (Chief Secretary's Office), and to Greg Bourne (No 10 Policy Unit).

Nigel Wicks

(N. L. WICKS)

Stephen Haddrill, Esq.
Department of Energy.

10 DOWNING STREET

LONDON SW1A 2AA

From the Principal Private Secretary

13 May 1988

I am sorry that I have not written to acknowledge your letter of 6 May. But as I told you today I am sending a copy of your report to the offices of the Secretaries of State for Energy and for Scotland and to the Chief Secretary to the Treasury with a request that they should provide an urgent evaluation of your proposals. I hope to write to you again before too long. Meanwhile, there is no reason why you should not approach the Department of Energy and the Scottish Office about these matters if you wish to do so.

(N. L. WICKS)

Allen Sykes, Esq.

pe R 17/5.

Allen Sykes

31 Charles II Street
St James's Square
London SW1Y 4AG
01-930 6200

Michael Spicer. Esq MP
Parliamentary Under Secretary of State
Department of Energy
Thames House South
Millbank
London SW1P 4QJ

13 May 1988

Resolving Scotland's Energy Dilemma

Over dinner two nights ago we briefly discussed the paper which I had sent in to Downing Street a week ago on how to resolve the dispute between the Scottish Electricity and Coal companies to the benefit of all parties and to the particular benefit of Scotland. I explained that as it affected at least four ministries and general Government policy, the paper had to go to Downing Street first, as you agreed.

I have discussed the matter with Nigel Wicks who having read the paper wanted you to see it anyway so I have much pleasure in enclosing two copies. I think you will find that this addresses the whole issue in an effective, humane and politically acceptable way.

I look forward to discussing it with you when you are ready.

With kind regards

Yours sincerely

Nigel, As agreed,

Yours,
Allen

cc: N Wicks Esq ✓

CONFIDENTIAL

cc Mr. Whittingdale,

Prime Minister

The line to take if the fast breeder reactor is raised with you in Scotland

N. L. W.
12-5

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

01 211 6402

Nigel Wicks Esq
Private Secretary to
Prime Minister
10 Downing Street
LONDON
SW1A 0AA

12th May 1988

Dear Nigel,

You asked for advice on the line that the Prime Minister might take if asked about the future of the fast reactor while she is in Scotland.

My Secretary of State answered questions on the fast reactor in the House earlier this week and subsequently saw Mr Maclennan in private. The Secretary of State has made clear that no decisions have been taken or are imminent. He has explained that the Government is spending over £70 million on the fast reactor programme and it must ensure that this money is being put to the best use. He has said that the fast reactor will be needed in due course but not on a commercial scale for at least 25-30 years. We therefore have to consider how the technology can most economically be preserved over that period. He has also pointed out that the problem of what to do with Dounreay cannot be postponed indefinitely because the reactor will, in any event, reach the end of its safe life within the next decade.

The Secretary of State has been pressed particularly on the social implications for Caithness. He has made clear that the problems for the locality are being fully taken into account.

I enclose copies of the Parliamentary Answers given by the Secretary of State and the briefing which we sent you for Prime Minister's questions last week.

Yours ever,

Stephen.

S HADDRILL
Principal Private Secretary

CONFIDENTIAL

PRIME MINISTER'S QUESTIONS DATE: 5 MAY 1988

TITLE: "FAST BREEDER REACTORS FACE THE AXE"

LINE TO TAKE

Mr Fairclough's "Review"?

The Government reviews all its R&D programmes from time to time.

That is good management.

We are considering a range of options for the fast reactor programme; no decisions have yet been taken.

What does this mean for the European Demonstration Reprocessing Plant (EDRP)?

My right Honourable Friend, the Secretary of State for Scotland, has received the Report of the public local Inquiry.

He will take all relevant factors into account in reaching his conclusions.

Has the CEGB withdrawn its funding?

The CEGB is continuing its contribution at present, but believes its successors will have less of an interest in supporting fast reactor R&D.

DATE: 5 MAY 1988

PRIME MINISTER'S QUESTIONS

TITLE: "FAST BREEDER REACTORS FACE THE AXE"

BACKGROUND NOTE

The Secretary of State for Energy is currently considering options for the fast reactor programme carried out by the UK Atomic Energy Authority (UKAEA).

The programme is estimated to cost £105m (net of electricity receipts from the Prototype Fast Reactor at Dounreay of some £14m) in 1988/9. The Department of Energy is providing £77m and the CEGB £28m.

The CEGB has recently informed the UKAEA that it foresees that its contribution to the programme will run down to zero by the estimated vesting date for the two new generating companies, 1 January 1988.

The UKAEA spends about £75m a year on the fast reactor programme at Dounreay. It employs 2150 people at the Establishment - about 20% of the total jobs in Caithness, where the unemployment level is currently 13.8%. Dounreay pays about £5m a year to local firms for goods and services.

In 1985, the UKAEA and British Nuclear Fuels plc (BNFL) applied for outline planning permission to build a Demonstration Reprocessing Plant (EDRP) for fast reactor fuel to service a series of reactors expected to be built by the European Collaboration, of which the UK is a part. The Secretary of State for Scotland is currently considering the Report of the public local inquiry, which was held in 1986.

AE Division
Department of Energy
5 May 1988

Mr. Parkinson: This is strictly a matter for my right hon. Friend the Secretary of State for Trade and Industry, who is dealing with this aspect of 1992. We have a meeting arranged with the Electrical Contractors Association, and I shall be interested to hear the views of its members.

Mr. Cryer: Does the Secretary of State agree that privatisation and competition involve cost-cutting exercises to increase profits? That is the main motivation of running private concerns rather than services. What guarantee does he have that directors in the privatised sector will not be as incompetent and criminally irresponsible as the directors of Townsend Thoresen?

Mr. Parkinson: The hon. Gentleman is making the mistake of assuming that profits can come only from what he describes as cost cutting, which implies sacking employees and behaving anti-socially. Operating efficiently can provide a useful source of profits and a useful source of help for the customer, who enjoys a keener price.

Mr. Andy Stewart: When the supply regulations are introduced after privatisation, will British Coal be allowed to compete fairly and equally with foreign imports that can be dumped here in the short term to decimate the British industry before prices are increased?

Mr. Parkinson: My hon. Friend knows that there is a huge market for coal that will exist way into the foreseeable future. Most of our electricity will come from coal. The Government have invested more than £9 billion in the past nine years to ensure that we have a modern, efficient British coal industry. Therefore, there is a market and the industry has been given the investment. If that is used properly, the British coal industry has nothing to fear.

Mr. Prescott: Will the Secretary of State confirm that his consultative document in which he promised new rights for the consumers includes provisions in the regulations for the duty to supply—which may be prosecuted for at the moment — to be prosecuted only through civil actions agreed by the director general of electricity supply? Will he also confirm that the duty to supply will now be reduced to supply on reasonable terms? Finally, will he confirm that the right to disconnect—which is qualified at the moment—will be unqualified? That is clearly a reduction of consumers' rights and in conflict with the Secretary of State's promise in his White Paper.

Mr. Parkinson: I do not know where the hon. Gentleman got those findings. No decisions have been taken on those matters. We are in the middle of a process of consultation about the possible supply regulations and no decisions of any kind have been taken. They will be taken after consultation.

Electricity Costs

8. **Mr. Hannam:** To ask the Secretary of State for Energy what plans he has in drawing up the regulatory framework for the electricity industry to include energy efficiency as an option for ensuring that electricity is supplied to the consumer at the lowest possible cost.

Mr. Michael Spicer: The details of the regulatory framework including their effect on energy efficiency are being considered with the Department's advisers. The regulatory system will encourage the industry to meet its customers' requirements at least cost.

Mr. Hannam: While welcoming my hon. Friend's reply confirming that energy efficiency if one of the options under consideration, will he accept that if we are trying to achieve the right balance between low-cost electricity for the consumer and profitability for the utilities, energy efficiency must be included in the powers given to the regulator and they must be strong enough to effect that kind of efficiency at the generating end and distribution ends?

Mr. Spicer: I listened carefully to what my hon. Friend the Member for Exeter (Mr. Hannam) said and we shall bear his remarks closely in mind. Our regulatory framework will be designed to promote energy efficiency through competition especially among generating companies.

Mr. Darling: Is the Minister still convinced that the insistence on providing a substantial proportion of electricity generation through the nuclear industry is the best means of providing low-cost electricity, especially in view of the difficulties and unknown costs of decommissioning and in light of this morning's report in *The Guardian* which suggests that nuclear power stations are running at below their generating capacity because of loading and unloading difficulties?

Mr. Spicer: The Government's position on that is quite clear. We believe that there should be a minimum of nuclear energy in this country for efficiency reasons. Also, there is no way in which we can tell at the moment what the price of fossil fuels will be in 20 years' time. Therefore, there is a very good reason for nuclear energy on economic grounds. Leaving that aside, we believe that there should be a thriving nuclear industry to ensure that we have a wide variety of energy sources.

Mr. Jack: What steps is my hon. Friend taking to ensure that all branches of Government respond enthusiastically to offers of private sector money to invest in energy-saving measures?

Mr. Spicer: The first step that I can take is to ensure that my hon. Friend's remarks are widely heard.

Mr. John Garrett: Will the Minister agree that for years the Government have claimed that their objective is to make Britain the most energy-efficient nation and that the Prime Minister set us a target of a saving of £7 billion on fuel bills? How will that be achieved unless the regulatory body has very strong powers and a duty to promote energy conservation? Is it not a fact that the present Secretary of State for Energy has much less interest in and commitment to energy efficiency than his predecessor?

Mr. Spicer: I listend carefully to my hon. Friend the Member for Exeter (Mr. Hannam) and to what the hon. Member for Norwich, South (Mr. Garrett) has just said about the need for efficiency as one of the criteria within the regulatory regime. However, I must repeat that a prime way of achieving efficiency, at least thermal efficiency, is through competition among generators and we shall ensure that the regulatory regime includes that.

Fast Breeder Reactor, Dounreay

9. **Mr. Haynes:** To ask the Secretary of State for Energy if he will make a statement on the future funding of the fast breeder reactor project at Dounreay, Scotland.

Mr. Parkinson: My Department reviews its expenditure on research and development each year, including that on the fast reactor. All options are considered, but no decisions have yet been taken.

Mr. Haynes: I know what this Secretary of State is up to. I can read it like a book, and I can read him like a book, too. There is a cut back so far as the financing of future projects is concerned. The same is true of research and development.

Mr. Parkinson *indicated dissent.*

Mr. Haynes: The Secretary of State should not look surprised. We know what is going on. The Government are cutting back on expenditure with a view to privatisation, so that they can have a cheap rake-off in respect of other public industries. Here we go again, so far as electricity is concerned.

Mr. Speaker: Briefly, please.

Mr. Haynes: I shall be brief, Mr. Speaker. I ask the Secretary of State to come off it and to be honest at the Dispatch Box with the people of this nation.

Mr. Parkinson: I thank the hon. Gentleman for his brevity and for the quietness with which he asked his question. This matter is in no way connected with the privatisation of electricity. The only connection is that the CEGB has been funding 30 per cent. of the cost of the fast reactor. The fact that it has taken a decision about its expenditure in no way affects the overall decision concerning the fast reactor. It is a complex issue and one to which we are giving serious consideration. It also has international aspects. Above all, it has enormous implications for the people of Caithness and Sutherland. We recognise our obligations to them, and when I am ready I shall come to the House with a statement about our policy. We are not ready to do so yet, and we are not prepared to be bounced by inaccurate newspaper articles.

Mr. Haynes: On a point of order, Mr. Speaker. In view of the unsatisfactory nature of that reply, I beg to give notice that I shall seek to raise the matter on the Adjournment.

Mr. Maclennan: I thank the Secretary of State for his robust recognition of his obligations.

Mr. Speaker: Order. I am not able to hear the hon. Member. I shall have to call him on another question, because this matter is to be raised on the Adjournment.

Magnox Reactors

11. **Mr. Frank Cook:** To ask the Secretary of State for Energy what recent information he has received from the Nuclear Installations Inspectorate about the future decommissioning of Magnox nuclear reactors.

Mr. Michael Spicer: The future of the Magnox nuclear power stations in the United Kingdom is a matter for the operators concerned, subject to their meeting the requirements of the Nuclear Installations Inspectorate.

Mr. Cook: I should like to be able to thank the Minister for that reply, but there is not a great deal for which I can thank him—it was a fairly empty statement. Can the Minister tell the House whether he is prepared to require the NII to consider the option, on decommissioning Magnox stations, of strengthening their primary and secondary cladding to improve the integrity of their structure, and perhaps use the redundant, cavernous capacity of disused turbine halls for storing — under managed, monitorable and redeemable circumstances— the nuclear waste which is causing so much trouble? It would not have to be transported all over the country to new sites because we would have on site the expertise to do the job that needs to be done.

Mr. Spicer: The hon. Gentleman is extremely knowledgeable in these matters and has demonstrated his knowledge on this occasion. The Government do not tell the NII what it should do in terms of its inspections, because the NII sets its own standards. We have full confidence in it and have made sure that it is fully staffed. The NII is the Government's expert body for ensuring standards, and we give it every support in maintaining those standards.

Mr. Campbell-Savours: Has the Minister received representations from the private sector on electricity generation under the fast breeder reactor programme? Will he place on record the statement that the FBR programme has been, and continues to be, a useful programme?

Mr. Spicer: I believe that relates to the previous question and not to this one, which concerns Magnox stations. They have nothing to do with fast breeder reactors.

Mr. Campbell-Savours: No, I am sorry, Mr. Speaker.

Mr. Speaker: Order.

Mr. Campbell-Savours: It was absolutely in order.

Mr. Speaker: I call Mr. Alexander Eadie.

South of Scotland Electricity Board

12. **Mr. Eadie:** To ask the Secretary of State for Energy if he has been informed by British Coal of progress made in its meetings with the South of Scotland Electricity Board regarding future coal burn at power stations.

Mr. Parkinson: These negotiations are a commercial matter for the two industries concerned, but I have asked to be kept informed.

Mr. Eadie: Does not the Secretary of State agree that, in the midst of the negotiations with British Coal, the South of Scotland Electricity Board is being provocative and threatening? We have learned that between 20,000 and 30,000 tonnes of foreign coal is now at Rotterdam awaiting delivery to the SSEB in small cargoes, and that 3,000 tonnes have already arrived at the Kincardine power station in Scotland. Did the Secretary of State not endorse the three-month agreement to halt foreign coal imports, to give time for British Coal and the SSEB to reach an agreement on coal burning in this country?

Mr. Parkinson: As the hon. Gentleman knows, I have made my position very clear. I cannot force either party to reach an agreement, although I should like them to do so, and I have been doing all that I can to encourage them. The negotiations are in hand, and I hope that they will be successful.

Mr. Maclennan: Is the Secretary of State aware that the SSEB is among the generating boards that are impressed not only by coal burn rates but by the burn-up rate of the fast breeder reactor—which is why it has put its weight behind the project for the future?

Mr. Parkinson: Yes. I want to make it clear that we wish to retain the fast breeder reactor technology for this country. The question is how we do that in the most economic way possible. As I said in answer to an earlier question, we are looking at all the aspects of the problem very carefully. I look forward to discussions with the hon. Gentleman when he comes to see me tomorrow.

Flue Gas Desulphurisation

13. **Mr. Pike:** To ask the Secretary of State for Energy whether he has recently discussed with the Central Electricity Generating Board its proposals for flue gas desulphurisation to reduce acid rain.

Mr. Michael Spicer: We are already fully aware that the CEGB plans to fit FGD equipment at a cost of £600 million to 6GW of existing plant as well as on all new coal-fired stations.

Mr. Pike: In view of the growing concern about acid rain both in this country and elsewhere in Europe, is the Minister satisfied that the CEGB is proceeding with the work as speedily as possible? Does the Minister not believe that it may be necessary to take action on some of the other power stations?

Mr. Spicer: The United Kingdom now has a 10-year sulphur dioxide emission control programme costing about £1 billion. We accept that that speed is appropriate for controlling emissions. It is not often realised that Britain has reduced its emissions by 40 per cent. since 1970, and by 25 per cent. by 1980. We have done a tremendous amount already to reduce emissions, and we intend to continue the programme.

Mr. Butler: My constituents will be very grateful for the £200 million investment in Fiddler's Ferry. But when my hon. Friend next meets the CEGB, will he suggest that some disruption may be caused to the local community in Cuerdley and ask the CEGB to minimise that disruption?

Mr. Spicer: I am sure that the CEGB will read carefully in *Hansard* what my hon. Friend said. The matter is clearly causing some local concern, and I am sure that the CEGB will be cognisant of that.

Mr. Patchett: With gas desulphurisation in mind, has the Minister discussed the future of the fluidised bed experiment at Grimethorpe, in my constituency? Will he make a statement?

Mr. Spicer: I am afraid that I cannot make a statement now, but the Grimethorpe plant is being considered very carefully.

Coal Industry

14. **Mr. Greg Knight:** To ask the Secretary of State for Energy, how much has been invested in the coal industry since April 1979.

Mr. Parkinson: Since 1979 the Government have provided British Coal with £9 billion of grants — together with substantial loan finance — of which £6 billion has been spent on capital investment.

Mr. Knight: Is not a healthy economy one of the prerequisites of any Government policy of substantial and continuing investment? Should not those who work in the coal mining industry be grateful to the Government not only for supporting worthwhile investment, but for helping to create an excellent economic outlook for Britain? Does my right hon. Friend agree that the biggest threat to the industry and to jobs within it comes from those who instigate unnecessary strike action, such as Mr. Arthur Scargill, and those who support such action, such as the leader of the Opposition? *[Laughter.]*

Mr. Parkinson: Not yet, but we shall all be voting for the hon. Member for Kingston upon Hull, East (Mr. Prescott).

It is important that modern working practices go with capital investment, and that strikes and waste are eliminated. Provided that we have modern working practices to go with modern machinery, I see a very bright future for British Coal, but every strike and work to rule lessen the prospects for the industry.

Mr. Douglas: Will the Secretary of State concede that a substantial proportion of the investment in Scotland has been in the Longannett complex, and that that investment has been endangered by the cavalier attitude of the South of Scotland Electricity Board in importing foreign coal at dumped prices? I recognise that the Secretary of State has shown an interest in this matter, but what steps is he taking to protect the nation's investment in the Scottish coalfields —an investment that can get a return only if the coal is burnt in SSEB stations?

Mr. Parkinson: There are two things in our proposals which I believe will improve the prospects for the Scottish coal industry. First, we are strengthening the inter-connector to England and Wales, which means that there is a big potential market for the electricity produced from Scottish coal. Secondly—and I am pleased to say that Scottish miners have shown great good sense about this —we are encouraging the adoption of modern working practices.

Although the investment has been made, Scottish coal is still relatively expensive. Therefore, we have to find ways of reducing the costs and opening up for Scotland the prospects of a good market. We are also encouraging the two parties to get together. I believe that the Government are doing what they can to ensure a good future for Scottish coal.

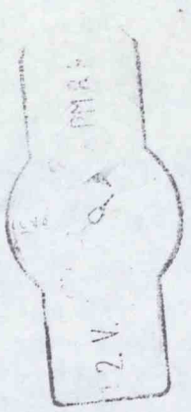
Mr. Gow: Despite my right hon. Friend's legitimate pride in the amount invested in the British coal industry during the past nine years, will he confirm that the whole of that investment could have been made by the private sector? What greater justification is there for retaining the ownership of British Coal in the public sector compared with the Government's conviction that the oil industry should be in the private sector?

Mr. Parkinson: We have no plans at present, but it is our ambition that the whole of the energy industries should be returned to the private sector. However, there is a limit to what we can do at any given time. I believe that privatising the electricity supply industry is a big enough job for us at present. I assure my hon. Friend that we have ambitions for the rest of the industries for which we are responsible.

Magnox Reactors

15. **Mr. John Garrett:** To ask the Secretary of State for Energy what representations he has received about the

ENERGY Policy pt 12



CONFIDENTIAL

WO631

PRIME MINISTER

11 May 1988

FAST REACTOR: SODIUM LEAK AT SUPERPHENIX PLANT

1. I promised to send you a note on the problems which led to the shutdown of the 1200 MW Superphenix plant last month. The plant is not expected to be restarted until the final quarter of this year at the earliest.

2. After two years slow build up, the plant reached full power at the end of 1986. The cost of producing electricity was roughly twice what it is costing France to produce power by the PWR but this was expected.

3. Liquid sodium is used as the coolant in the core. It was also being used for the storage of the spent fuel. On 2 April there was a leak from the fuel storage tank (the barrière) due to hydrogen embrittlement of a weld. It took some time to establish where the leak was coming from. The reactor was shut down. By that time 25 tons of liquid sodium had leaked into the outer skin of the storage vessel.

4. The French safety authorities have now specified two conditions that must be satisfied before the reactor can be restarted:-

a) suitable inspection facilities to ensure no similar leak could occur of liquid sodium in the main vessel surrounding the core;

b) improved arrangements for storing the spent fuel.

5. The company is now testing a robot inspection system for the main vessel which is likely to satisfy the first condition. To meet the second condition however a major redesign of the fuel storage arrangements is now proposed which would involve storage in a gas filled tank (using the inert gas argon). The safety authorities are due to meet on 26 May when they are to decide whether, subject to satisfactory progress on the gas filled tank, the reactor can be authorised to be restarted in the last quarter of this year.

JOHN W FAIRCLOUGH
Chief Scientific Adviser

10. V. PM88

009/4211

CCBG.

CONFIDENTIAL

Treasury Chambers, Parliament Street, SW1P 3AG

The Rt Hon Cecil Parkinson MP
Secretary of State for Energy
Department of Energy
Thames House South
Millbank
London
SW1P 4QJ

NBPM
RLG
16/5

9th May 1988

Dear Cecil,

NON-FOSSIL FUEL OBLIGATION at flap

Thank you for your letter of 4 May, with a draft written PQ on this obligation.

Like you, I am not convinced that the Government needs to make such a statement. The CEGB retains the obligation to supply and should argue its case accordingly. But if you do make a statement, the last sentence of the draft should, in my view, be amended. Although vague, it gives too strong an implication that the Government will guarantee an obligation sufficiently high to ensure demand for the output of four PWRs, by the year 2000. I would prefer a looser form of words that does not prejudge our views, either on the desirability of the further stations (bearing in mind that the consumer will bear the costs of uneconomic investment in nuclear power), or on the extent to which nuclear capacity will pre-empt the scope for new capacity. We do not, as a result of the obligation, want to prevent the development of competition in generation by squeezing out both the smaller generators and new entrants. I would suggest instead:

> "...the target for the medium term will take full account of the present level of existing and committed nuclear and renewable generating capacity."

If the CEGB feel unable to accept this wording, I would greatly prefer that no statement was made at all. We can then separately consider the precise formulation of the obligation

ENERGY: Policy Pt 12

CONFIDENTIAL

and its level, taking account of the wider objectives of privatisation; and the Government will remain free to come to its view on the economic justification of individual stations.

I am copying this letter to the Prime Minister, Malcolm Rifkind and Sir Robin Butler.

Yours Ever,

John

JOHN MAJOR



SECRETARY OF STATE FOR SCOTLAND

ST. ANDREW'S HOUSE
EDINBURGH EH1 3DG

CC BG

NBPM
PRC6
9/5

The Rt Hon Cecil Parkinson MP
Secretary of State for Energy
Department of Energy
Thames House South
Millbank
LONDON

9 May 1988

Dear Cecil,

NON FOSSIL FUEL OBLIGATION

Thank you for copying to me your letter of 4 May to Nigel Lawson.

I have no difficulty with the terms of your proposed Parliamentary Answer and am sure it is desirable for the Government to make its intentions clear in this way. Although I envisage taking a similar power to protect the fuel diversity of the Scottish industry in the longer term, the present level of non fossil capacity in Scotland means that this must be considered simply as a reserve power for the foreseeable future.

I am copying this to the Prime Minister and Nigel Lawson.

Yours ever,

MALCOLM RIFKIND

DKE02378.058

Energy - Policy PV12



Allen Sykes

31 Charles II Street
St James's Square
London SW1Y 4AG
01-930 6200

N Wicks Esq
Principal Private Secretary
10 Downing Street
London SW1 OAA

6 May 1988

Dear Nigel,

Making Scotland a Low Cost Power Producer and a Major Exporter

I am enclosing two copies of a brief paper I have written on the above subject which I think will be of particular interest to the Government. At present a three month truce exists in the dispute between British Coal and the South of Scotland Electricity Board which if not resolved by the end of June, goes back to the Courts. It is very unlikely that the Courts can resolve this particular problem to everybody's satisfaction. By standing back and looking at the dispute from a national perspective, it is apparent that not only can the dilemmas be resolved but it is also possible to confer major advantages on the Scottish economy and incidentally to contribute to greater competition to electricity generation in England and Wales.

For ease of reading the paper contains a one page summary but obviously that cannot do justice to the analysis and the reasons for the conclusions. While I am in regular contact with the Secretary of State for Energy, the Financial Secretary to the Treasury, and occasionally with the Secretary of State for Trade and Industry, I am sending this paper to you because, as you will see when you have read it, it touches upon such a wide range of issues that it needs to be addressed to the Prime Minister in the first instance.

I have discussed the idea with Greg Bourne in the Policy Unit who has seen the report in draft form and feels the ideas and recommendations put forward merit careful consideration.

Accordingly I am sending him a copy of the final version of this report as well as to Brian Griffiths and George Guise. I hope you find it of interst and, of course, I am very ready to discuss it with you if required.

With kind regards

Yours sincerely

Allen Sykes

cc: G Bourne Esq
G R J Guise Esq

CONFIDENTIAL

10 DOWNING STREET
LONDON SW1A 2AA

From the Private Secretary

6 May 1988

NON-FOSSIL FUEL OBLIGATION

The Prime Minister has seen your Secretary of State's letter of 4 May to the Chancellor of the Exchequer. She is content with the proposed Written PQ Answer for 9 May.

I am copying this letter to Alex Allan (H. M. Treasury), David Crawley (Scottish Office) and Trevor Woolley (Cabinet Office).

Paul Gray

Stephen Haddrill, Esq.,
Department of Energy.

CONFIDENTIAL

10 DOWNING STREET

Thks.
NFA
— p.c. with
Hansard
on file.
RRCG
16/5

Paul

Please refer to your note on CST letter of 9 May w/ flap.

DEnergy tell us they will not be issuing any reply.

Thks. Can you please check whether the arranged PQ was answered.

Keith
16/5

RRCG
16/5

Paul PQ was answered 11 May
Hansard extract attached
Yom
16/5

CABINET OFFICE

Paul Gray RA

With the compliments of

You may like to see a copy of this.

VIVIAN BROWN

5 May 1988

70 Whitehall, London SW1A 2AS
Telephone 01 270 0320

cc Paul Gray
Coleen Harris.

Qd.095

File ref: ST 112/5/2

MR HILTON

cc Mr Fairclough
Mrs Bloom

5 May 1988

FAST REACTOR: GUARDIAN ARTICLE 5 MAY

1 You asked for defensive briefing on the article which appears in the front page of today's Guardian.

2 I suggest the following line:-

- the Government announced last July in its White Paper (Cmnd 185) that it was setting up new machinery to review its science and technology expenditure and to establish priorities for the future. This covers all programmes including the fast reactor

- for programmes like the fast reactor which are aimed at commercial exploitation the issue for Government is to decide when the research has reached the stage at which future development should be the responsibility of the relevant industry. The CEGB is already funding 30% of the programme

- responsibility for reviewing individual programmes such as the fast reactor rests with the spending Minister concerned, in this case the Secretary of State for Energy.

3 I have discussed this line with Steven Hadrill in Mr Parkinson's office and he has suggested you keep closely in touch with the DEn Press Officer who has discussed the report with Mr Parkinson.

VIVIAN BROWN

CONFIDENTIAL

SECRETARY OF STATE FOR ENERGY

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

01 211 6402

Prime Minister
Content with the draft Written PQ?

PRCG
5/5

The Rt Hon Nigel Lawson MP
Chancellor of the Exchequer
H M Treasury
Treasury Chambers
Parliament Street
LONDON
SW1P 3AG

Yes mt

4th May 1988

Dear Chancellor,

NON-FOSSIL FUEL OBLIGATION

Our decision to remove the obligation to supply from the CEGB's successors raises an issue in relation to the conduct of the Hinkley Inquiry. The CEGB feel that it makes it difficult for them to argue the national need case, an issue that the Inquiry will have to consider.

At future Inquiries the need case can be examined against the non-fossil fuel obligation announced in the White Paper; it will be clear whether or not the Area distribution companies need to contract for power from a new nuclear station in order to meet that obligation which will have to be set as a future target. The CEGB say that the difficulty with the Hinkley Inquiry is that we have yet to reach decisions on the precise level of the obligation, and they are concerned that the White Paper proposals are insufficiently detailed for the purposes of the Inquiry.

I believe that the Board is making heavy weather of this point: the CEGB retains the obligation to supply and needs to discharge it until Parliament has changed the law. However, to keep the nuclear programme moving and, above all, to ensure that the Hinkley Inquiry is not unnecessarily delayed or protracted I am prepared to make a public statement along the lines of the attached draft written answer. This would meet the CEGB's concerns without committing me to any particular level of obligation. It makes it clear that the Government's present intention is to set a target that non-fossil fuel capacity contracted for by the distribution companies for the year 2000 should not be below the present level of existing and committed nuclear and renewable generating capacity.

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This formulation would cover the Sizewell "family" (Sizewell 'B' and 'C', Hinkley Point 'C', and Wylfa). This would be consistent with the Government's general nuclear policy aims, both in the context of the Sizewell decision itself and in relation to the broad strategic aim of maintaining roughly the present contribution of nuclear power to electricity supplies. A weaker formulation which, for example, only covered Hinkley 'C' itself would be difficult to square with our declared continuing commitment to nuclear power, and would risk undermining the concept of a "family" of Sizewell-like PWRs, which is central to the economics of the programme. (I shall, of course, in the exercise of my statutory discretion, have to judge each application on its merits at the time.)

There is some urgency in relation to the Hinkley Inquiry. Their Outline Statement of Case must, under the Inquiry procedure rules, be published by 16 May; printing requirements mean that it needs to be finalised a little before then. I therefore need to make this statement on 9 May.

I am copying this letter and enclosure to the Prime Minister, Malcolm Rifkind and Sir Robin Butler.

Yours sincerely,

S. Hadlow

CECIL PARKINSON

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

CONFIDENTIAL

DRAFT WRITTEN PQ

Q. To ask the Secretary of State for Energy, whether the Government has yet decided the details of the non-fossil fuelled obligation which will apply after the privatisation of the electricity supply industry in England and Wales, and if he will make a statement.

A. As the White Paper on Privatising Electricity (Cm 322) made clear, the Government has decided that the obligation will be expressed in terms of a requirement for the distribution companies to contract for a specified minimum proportion of non-fossil fuelled capacity. This will ensure that both nuclear capacity and renewable sources of power will be able to make a contribution to maintaining diversity of fuel sources in the electricity supply system. The distribution companies will be able to seek such capacity from any source, including own generation (within any general limits on this that may be laid down), providing any necessary safety, planning and other consents are obtained. The obligation will set a minimum level of non-fossil fuelled capacity; there will be nothing to prevent distribution companies contracting for or generating companies building a higher level of plant.

It is intended that the requirement will be embodied in an Order in the form of a statutory instrument made by the Secretary of State under powers to be sought in the main privatisation legislation. What follows is therefore subject to Parliament approving that legislation.

The Government believes that, in order to give an effective and clear statement of strategic priorities, and to set the background for the series of power station applications submitted and intended to be submitted by the Central Electricity Generating Board (the benefit of which will be

transferred to the CEGB's successor companies), it would be right to set the level of the obligation as a future target. The White Paper made it clear that the proportion of non-fossil fuelled generating capacity required to be under contract would be fixed at a level achievable at the time of privatisation. The precise level at which the target should be set is still under consideration. However, the Government's present intention is that when it is set, the target for the year 2000 will not be below the present level of existing and committed nuclear and renewable generating capacity.

la17

Cite PM
cc BS

10 DOWNING STREET
LONDON SW1A 2AA

From the Private Secretary

CATHY CUNNINGHAM

CABINET OFFICE

ACOST REPORT ON THE INDUSTRIAL IMPACT OF SIZEWELL 'B'

We discussed your minute of 28 April and John Fairclough's earlier note of 22 April.

I confirm that I see no objections to publication on Wednesday 4 May. But we agreed it would be better to change the second sentence of the comment attributed to Sir Francis Tombs in the draft press release to read: 'ACOST was able to report to the Government at a time when the arrangements for privatisation were under consideration. We hope the report will now contribute to the wider debate'.

PAUL GRAY
28 April 1988

CEBG.

Qn 0492

MR GRAY
No 10

cc Mr Brand - DEn

28 April 1988

Mr Gray

ACOST REPORT ON THE INDUSTRIAL IMPACT OF SIZEWELL `B'

file with PG

Following John Fairclough's minute of 22 April I enclose the Press Release which will go out on Wednesday, 4 May.

I would be grateful for any comments by **noon Friday, 29 April.**

Cathy Cunningham

CATHY CUNNINGHAM

Encs

3/88

4 May 1988

ACOST REPORT ON INDUSTRIAL IMPACT OF POST-SIZEWELL NUCLEAR REACTOR POLICY

The Advisory Council on Science and Technology (ACOST) today publishes a report* on the industrial impact of post-Sizewell nuclear reactor policy. It results from work started in April 1987 by a group under the chairmanship of Lord Flowers.

Sir Francis Tombs, ACOST chairman, said today:" The report comes at an important time in the development of the Electricity Supply Industry. The change in preferred reactor type from an indigenous to a foreign design and the decision to privatize the industry could have far-reaching consequences".

Lord Flowers, chairman of the working group said: "The Sizewell design is the 'state of the art' and its construction could be beneficial in creating an internationally competitive supply industry. Whatever the manner of privatization of the ESI, it is essential that the UK can develop and maintain a competitive supplier base for designing, procuring and constructing nuclear stations."

The executive summary and recommendations of the report are attached.

* The Industrial Impact of Sizewell 'B',ISBN No. 0 11 630832 X

Issued on behalf of ACOST by

Information Services
Cabinet Office
Room 57/G, Government Offices
Great George Street
London SW1P 3AL
Telephone No: 01-270 6356

NOTES FOR EDITORS

1. Terms of reference for the study into post-Sizewell nuclear reactor policy

"To assess the impact of future UK reactor policy, in the light of the Government's decision to construct a pressurized water reactor at Sizewell, on the requirements for industrial R&D and on the resultant technological and commercial opportunities, taking particular account of:

- skilled manpower requirements for R&D within power station construction, operation, regulatory organisations and the fuel services.
- the development of advanced manufacturing methods, and the export potential for systems or components.
- the opportunity costs of expending resources on development programmes for more than one reactor type."

2. Members of the working party

Lord Flowers (chairman)	Vice-Chancellor, University of London
Mr Con Allday	British Nuclear Fuels Ltd.(retired)
Mr John Collier	Chairman, United Kingdom Atomic Energy Authority
Mr Brian Cook	Engineering Manager, Shell Exploration and Production
Sir Sam Edwards	University of Cambridge (Chief Scientific to the Department of Energy)
Prof Ian Fells	Department of Chemical and Process Engineering University of Newcastle upon Tyne
Mr Eric Hammond	Electrical Electronic, Telecommunication and Plumbing Union
Prof David Leslie	Queen Mary College, University of London
Mr Michael Posner	Secretary General, European Science Foundation
Dr Alan Rudge	Research Director, British Telecom

~~① NAB~~ ② Reg.

FOLIO

W0617

MR GRAY

22 April 1988

ACOST REPORT ON THE INDUSTRIAL IMPACT OF SIZEWELL B

The publication date for the ACOST report has now been arranged for Wednesday 4 May and I would be grateful if you could let me know if this date is likely to cause any difficulties.

2. The ACOST Secretariat have prepared a draft press release and will be circulating this for comments within the next few days.

JWF

JOHN W FAIRCLOUGH
Chief Scientific Adviser

cc Stuart Brand, Dept Energy

Executive summary and recommendations

1.1 Following the publication of the report of the Sizewell 'B' Public Inquiry, chaired by Sir Frank Layfield, and the subsequent Government decision to authorize construction of a pressurized water reactor (PWR), the Advisory Council on Applied Research and Development (ACARD) — which subsequently was reconstituted as the Advisory Council on Science and Technology (ACOST) — set up a Working Group to examine the industrial implications of the future UK nuclear programme.

1.2 The primary objective of the Working Group was the quantification of the effects of the introduction of a non-UK design of reactor upon employment, the availability of skilled resources, and on imports and exports. Its underlying rationale was to complement the Public Inquiry report using its conclusions as the starting point. Government support for nuclear power generation has been assumed throughout this study, in addition to its resolve to privatize the Electricity Supply Industry (ESI).

1.3 A nuclear programme requires a high level of investment in manufacturing infrastructure, and in order to develop and maintain the long-term efficiency of the nuclear industry we recommend that clear priority is given to the ordering of plant at a rate which allows for the development and retention of the necessary skills and technologies, allied with an even loading of manufacturers' facilities. The full economic benefits of a programme will not be realized without strictly controlling the evolution of the design, approaching complete replication.

1.4 In these circumstances it is essential to concentrate for many years on the provision of only one thermal reactor design. We agree with the Central Electricity Generating Board (CEGB) that efforts should be directed towards the construction of the PWR now that the decision to proceed with Sizewell 'B' has been taken. Although sufficient resources must be allocated to achieving the safe and efficient operation of the Advanced Gas Cooled Reactors (AGR), we consider that there is no point in spending extra money in maintaining the option for the construction of further AGRs.

1.5 The decision to build an internationally accepted design of reactor has potentially exposed British manufacturing industry to an increased degree of foreign competition, a position which will become even more evident in the future if the European Community (EC) removes some of the energy sector trade restrictions which exist between EC countries. UK industry is expected to obtain contracts worth 93% of the value of the hardware for Sizewell 'B', of which most, but not all, will probably be spent in the UK. It should be able to compete for an even higher fraction for future PWRs if steps are taken by manufacturing industry to identify those power station components which are currently imported, with a view to providing the necessary investment in facilities and technologies to enable domestic production.

1.6 The choice of a PWR will not have a large impact upon total UK employment. The fact that the UK is able to manufacture PWR components should increase the long-term opportunities for those companies exporting PWR equipment and services, particularly those items which require technical endorsement within a PWR environment. The development and subsequent maintenance of a competitive domestic industry producing PWR components should also prove beneficial in the export market for the upgrading and repair of existing overseas stations. Success in the export market will depend upon the ability of UK companies to be internationally competitive and upon the maintenance of a design within the UK which is compatible with the mainstream of PWR development.

1.7 The introduction of a reactor type new to civil nuclear power in the UK has so far not necessitated substantial increases in skilled manpower resources dedicated to research and development (R&D), or design, or for licensing purposes. This is, in part, due to the availability of a large body of data from overseas PWRs and some redistribution of manpower away from gas-cooled nuclear R&D. The core of nuclear expertise originally developed for gas-cooled reactors has, so far, required only limited expansion to accommodate the different technology unique to the PWR design. However, if there is not to be a shortage of skilled engineering manpower to carry out the future nuclear programme, there will need to be special training given to overcome problems arising from the low level of construction over the last decade, combined with an adverse balance between recruitment and retirement.

1.8 The Government has a responsibility to underpin long-term ventures in power generation. That has included the development of the fast reactor, the basic technical and engineering feasibility of which has been demonstrated. The investment of public funds in design and R&D for this system has been considerable. We also note, with approval, that funding of the fast reactor is increasingly being transferred away from Government to the CEGB in recognition of the fact that this technology is approaching commercialization, and recommend that this process should be accelerated. The question of the possible transfer of responsibility for the fast reactor to the utilities is a matter which requires addressing simultaneously with the privatization of the ESI.

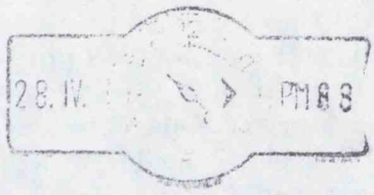
1.9 We believe that the Nuclear Installation Inspectorate (NII) should be able to maintain a sufficient cadre of engineers and other relevant skills to carry out its important functions without imposing delay at any stage in the construction of a nuclear power station. We consider that, in addition, it would be advantageous for the NII to increase the account it takes of factors such as the human element (prominent since Chernobyl) and to take a full part in discussions on the development of international standards of safety assessment. It is also important that the Health and Safety Executive (HSE) and the NII should pursue the recommendations in the report of the Sizewell 'B' Public Inquiry towards an increased economic discipline on assessment criteria. In addition, we recommend that in the future the NII provides utilities with a clearer knowledge of the requirements under which a design will be licensed, and that opportunities be taken to move towards a more definitive statement of design requirements: that is, to a more prescriptive mode of the ALARP (As Low As Reasonably Practicable) principle.

1.10 Since the Working Group was set up, the Government has announced its resolve to privatize the Electricity Supply Industry (ESI). Whilst no specific proposals for this have been published, we have taken some aspects of this development into account. We consider that the Government's commitment to nuclear power cannot be fulfilled unless it ensures that after privatization utilities which possess nuclear plant have the technological resources, capitalization and tariff structures necessary to retain such capacity as a safe and economically attractive option, and that account is taken of the future market structure of the manufacturing and engineering industry serving the nuclear programme.

1.11 The project management arrangements instituted between the CEGB and the National Nuclear Corporation (NNC) for Sizewell 'B' are not ideal for the long term. We recommend that in the arrangements for the privatization of the ESI, consideration should be given to concentrating the relevant resources and management responsibilities in one organization so that the design, procurement and construction of future civil power stations can be carried out to time and cost. The Government should regard the privatization of the ESI as a splendid opportunity to implement such a change in the industry's market structure.

1.12 The detailed arrangements for such a design and construction (D&C) organization depend greatly on the manner of privatization of the ESI, and this is a subject beyond our terms of reference. It is clear, however, that if a major utility is created possessing a strong financial, managerial and technological capability, a choice exists between the options of grouping the D&C expertise in a subsidiary of the utility, or embodying that expertise in an independent entity which would be fully capable of designing and arranging the procurement of nuclear stations and which would operate on a commercial client-customer basis. The latter option would be more suitable if the ESI in England and Wales was divided into small units. We make no specific recommendations regarding the choice between these options but in any case see no reason for the Government to hold a substantial stake in any design and construction company. We recommend that, even if the electricity generation and distribution organization are retained in the public sector, the Government's shareholding in NNC should be released into the private sector. We make no recommendation on the manner of the release or the future ownership of the shares.

ENERGY: Policy Pt 12



cc BG

W0617

C.F.

D/GNG - WLB.

Pl. ask D/Energy
whether they have
any comments.

PRCG 26/4

MR GRAY

22 April 1988

ACOST REPORT ON THE INDUSTRIAL IMPACT OF SIZEWELL B

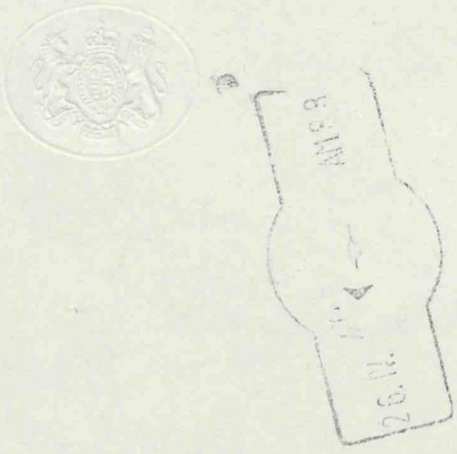
The publication date for the ACOST report has now been arranged for Wednesday 4 May and I would be grateful if you could let me know if this date is likely to cause any difficulties.

2. The ACOST Secretariat have prepared a draft press release and will be circulating this for comments within the next few days.

JWF

JOHN W FAIRCLOUGH
Chief Scientific Adviser

cc Stuart Brand, Dept Energy



26. IV. 1992 AM 8 8

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WO618

PRIME MINISTER

22 April 1988

FAST REACTOR

E(ST) will discuss on Monday 25 April the reviews of near market R&D by the Department of Energy, Department of Trade and Industry and Agricultural Departments. While the fast reactor is part of the energy review Mr Parkinson's paper does not make proposals on the future of this work as he has not completed his discussions with those involved. I understand he is to discuss the position with you on Monday.

2. Government expenditure on the fast reactor in the current year, including the 10% surcharge paid to the UKAEA on all research commissions, is £93m. This represents 63% of the UK costs of the international programme, the remaining 37% being borne by industry and sales of electricity from Dounreay. The work is clearly well beyond the research phase and has in my view reached the stage at which the electricity supply industry and the design, construct and component industry should take the lead responsibility in the remaining work, which is primarily concerned with commercial development; otherwise, the Government should be prepared to consider terminating its support. This would add substantially to the funds which could then be redirected to higher priority areas in science and technology.

3. The purpose of this minute is to suggest that it would be very helpful if Mr Parkinson's proposals for the fast reactor could be available in time for the meeting of E(ST) on 9 May when the issue of redirection and priorities for science and technology is due to be discussed.

4. I am copying this to Mr Parkinson and Sir Robin Butler.

JOHN W FAIRCLOUGH
Chief Scientific Adviser



22 IV. 1988

cc BWp

PRIME MINISTER

FAST BREEDER REACTOR

Mr Parkinson has provided the note below on a fast breeder reactor for you discussion with him on Monday. He asks particularly for your views on the appropriate forum for discussing this issue with colleagues.

The matter could be considered in either of two ministerial committees - E(ST) - as an item arising out of the Review of Government R&D Expenditure or E(A) - as an item with significant economic policy consequences.

I think E(A) to be the right forum. Certainly the future of the fast breeder reactor has consequences for Government R&D policy. But is also has important consequences for Scotland (both political and economic) and international co-operation with France and Germany. It is too big a subject for E(ST).

John Fairclough is anxious that any savings which might arise as a result of a decision to reduce work on the fast breeder reactor should not be swallowed up by the Treasury but should be deployed for other R&D purposes. If Ministers agree with that approach, they can as easily decide that in E(A) as in E(ST).

N.L.W.

PM asked Mr Parkinson to produce a paper or how a run down might be managed/phased with info. on age structure, reliability + potential for transfer. She would consider this pp + then it would be discussed in a small group (Sc. C/Ex S/SDEn)

N.L. Wicks

22 April 1988

MJ2CHD

N.L.W
25.4

SECRET & PERSONAL

CC B/UP

1

COPY NO 1 OF 9

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

01 211 6402

Nigel Wicks Esq CBE
Principal Private Secretary to
The Prime Minister
10 Downing Street
LONDON
SW1A 2AA

22nd April 1988

Dear Nigel,

My Secretary of State is grateful to the Prime Minister for agreeing to an early discussion on the fast reactor.

As you requested I attach a note to provide a basis for discussion. The Secretary of State has identified the principal options for future funding and has clarified his own views on these options. However, there are wide political, as well as energy, considerations and the Secretary of State wishes to discuss these with the Prime Minister before coming forward to colleagues. The Secretary of State would also like the Prime Minister's views on the appropriate forum for discussion with colleagues.

Yours ever,

Stephen.

S HADDRILL
Principal Private Secretary

SECRET & PERSONAL

FAST REACTOR R&D: THE NEED FOR REVIEW

When the Government last reviewed the fast reactor programme in 1982, it concluded that, while it would be of major strategic significance for energy supplies, the ordering of a commercial series of reactors was not likely before the earlier part of the next century. It was decided to continue with a substantial development programme, based on international collaboration. Nigel Lawson made an announcement to this effect. Events since 1982 are summarised in Annex 1. The fast reactor continues as the Department's largest R&D programme. In 1987/88 it cost £115 million, of which the Department paid £75 million.

Some £3.5 billion in current prices has been spent by the UK in developing this technology since 1951, and further large sums have been spent by other countries.

In recent years the case for continuing with a significant UK effort has become weaker. It is hard to see commercial deployment of fast reactors for another 25-30 years, or even longer. Low uranium prices make it very difficult for them to overcome their inherent capital cost disadvantage in relation to the PWR, and utilities do not see a need for them for some decades.

Whilst the Government's electricity privatisation proposals have not affected the substance of the case for and against continuing expenditure, they have brought the issue into sharper focus. Lord Marshall has told the UKAEA that the CEGB wishes to phase out by 1 January 1990 its contribution (currently £28 million per annum) to the programme. The prospects for a significant contribution from the eventual privatised industry are poor. HMG is therefore likely to have to finance most of any continuing programme, should there be one.

We have considered a range of options, as follows:

(i) carry on with virtually the full range of work. The cost would be £90 million per annum, plus additional costs of perhaps £10 million per annum, arising from decommissioning some plant at Dounreay;

(ii) close Dounreay but continue with most of the rest of the R&D programme carried out at other AEA sites. This would cost perhaps £50 million per annum for the continuing R&D programme, plus £40 million per annum for decommissioning and redundancies in the early years. This option would still allow for continued participation in the European fast reactor collaboration;

(iii) close not only Dounreay but all the main R&D work retaining no more than a low-cost programme to keep abreast of developments. Decommissioning and redundancy costs under this option are estimated at £60 million per annum in the early years. This course would leave the option of licensing the technology, probably from Japan or France.

Decommissioning costs will of course have to be borne in any case. The only question is when; the earlier you close the sooner you spend. PFR is in any case expected to reach the end of its useful life in another 10 years or so.

We have explored an option intermediate between (ii) and (iii), with R&D expenditure of £25-30 million, for a final further period of five years. The AEA consider, however, that this would not allow a worthwhile programme.

Continued expenditure on the fast reactor cannot be justified on energy policy grounds. There is no clear pay-off in any reasonable timescale, and we expect to be able to license the technology as and when it is needed. If Dounreay was kept going for another 10 years we would still be years away from a commercial fast reactor. The AEA wish to keep going because of the programme' strategic importance and in order to preserve the option of British industry getting a good share of any eventual commercial programme. Given the timescale, there are however no real signs of interest at this point from UK firms. The AEA have also argued for continued funding until the privatised esi has had a chance to reach a view. However, as stated above, potential interest by the esi seems pretty small. Withdrawal from the fast reactor would hit the AEA hard - it accounts for more than a quarter of its turnover - but this in itself cannot justify programme expenditure. BNFL would also like the fast reactor to continue - withdrawal would remove the main rationale for reprocessing. They say this could affect prospects for further THORP business if the Japanese thought that our commitment to nuclear was weakening. On the other hand, they cannot quantify this effect, and in the light of the privatisation proposals, the Government's commitment to nuclear can scarcely be in doubt.

Against this background the Secretary of State favours option (iii).

There are two important, wider considerations:

(i) Caithness, where Dounreay accounts for about 20% of direct employment. Closure of PFR and the reprocessing plant would mean the loss of 1,500 out of the 2,000 AEA jobs at Dounreay. The total effect on the Caithness economy would be very severe;

(ii) withdrawal would be a serious setback for the European collaboration. The Secretary of State has recently visited both countries. For the German authorities the fast reactor is in the front line in the nuclear debate; they do not want to give a victory to the Greens, or the anti-nuclear SPD. The French would see withdrawal as prejudicial both to the collaboration and the general nuclear climate, on which, with their large nuclear dependence, they are very senstitive.

Department of Energy
22 April 1988

ANNEX I

FAST REACTOR

THE 1982 MINISTERIAL REVIEW AND DEVELOPMENTS SINCE THEN

Ministers reviewed policy on the fast reactor in 1982. It was decided that a substantial UK development programme, based largely on the Atomic Energy Authority's (AEA) site at Dounreay, should continue; but, in the light of the longer timescales available before fast reactors would be needed, the Government wished to explore the potential for collaboration with other countries.

2. Following the review, the UK negotiated entry into the European Collaboration with the signature of the inter-Governmental Memorandum of Understanding (MoU) in January 1984 by the UK, France, Germany, Italy and Belgium. In 1985 the AEA and British Nuclear Fuels (BNFL) applied for outline planning permission for a European Demonstration Reprocessing Plant (EDRP) for processing fast reactor fuel at Dounreay. The Inquiry Reporter's recommendations were submitted to the Secretary of State for Scotland before Easter.

3. Total expenditure on the programme has been cut by some 40% in real terms since 1981. The CEGB became joint funders of the programme in April 1987, contributing some 30% to the programme's net costs. As a result of this and earlier reductions, the Government's own contribution has fallen by nearly 60% in real terms since 1981. It now stands at £75 million per annum. The CEGB has recently informed the AEA that it wishes to phase out its contribution by 1 January 1990.

The Strategic Case for the Fast Reactor

4. The 1982 policy review concluded that the fast reactor would be of major strategic significance for the UK and the world's future energy supplies and the UK was among the world leaders in its development. The strategic case rests upon the UK's ability, using fast reactors, to produce electricity

a) without recourse to imported ore or fossil fuel and

b) at a cost at maximum not much more than present best generating costs

Fast reactors extract 50 times more energy from uranium than can thermal reactors. To do this, they need reprocessing plants to extract the plutonium which is bred in the core. Reprocessing is therefore an integral part of the fast reactor system.

5. Behind the strategic case is the fact that the UK has large stocks of depleted uranium from thermal reactors - enough, if used in fast reactors, to produce 500 years of electricity at current rates of consumption. These stocks, together with an initial charge of plutonium (of which we currently have enough stocks for three commercial-size fast reactors and this stockpile is being added to at a rate of 1.5 - 2 tonnes p.a.), mean that a programme of fast reactors could be implemented without the need to import more uranium.

6. On the basis of present designs, the specific capital cost (£ per KW of output) of a fast reactor would be some 30% higher than that of PWRs. Unless these capital costs can be brought down significantly, the economic case for fast reactors rests on the running costs being lower. This in turn depends on the price of uranium rising significantly.

Developments since 1982

(i) Fossil Fuel Prices

7. The outlook for oil and gas prices has changed since the time of the last review. The high oil price between 1979 and 1985 encouraged exploration and new discoveries were made. It is now estimated that the world has enough to last another 45 years at current rates of consumption. In 1982, the estimate was less than 30 years. World oil reserves are also more widely spread. Forecast prices for oil and gas, and coal, are therefore lower.

(ii) Uranium and the outlook for nuclear power

8. Lower fossil fuel prices, together with other factors such as the effect of the Chernobyl accident and the lowering of the forecasts for the demand of electricity, have led to a slackening of the pace of development of nuclear power. Forecasts of demand for uranium have therefore fallen since 1982. On the supply side, new deposits have been found , for example, in Canada. At current rates of consumption, there is enough uranium to fuel thermal reactors, at increasing cost, for at least 100 years.

(iii) Fast Reactor Cost Reduction

9. The design and development work that has been undertaken since 1982 has led to significant reductions in the costs of the fast reactor system. The most recent study by the UK industry estimated that the fast reactor's generating cost (pence per KWh) would be 1.2 times higher than that of a PWR.

(iv) The European Collaboration

10. France, which has the technological lead, brought the world's first commercial-scale fast reactor, Superphenix, to full power at the end of 1986 but has since hit a severe technical problem with a leak of sodium from the fuel

storage vessel. The reactor is not expected to restart until the Autumn at the earliest. The French electricity utility has put back plans for a second station by 5 years. The French development programme has been reduced although it remains much larger than the UK's.

11. Germany has been unable to commission its 300 MW prototype fast reactor, started in 1975, because the local licensing authority is controlled by anti-nuclear Social Democrats. A decision is not expected until after the local elections in 1989. Nuclear power in Germany has taken a severe knock because of the Transnuklear affair.

12. In Italy, the referendum of last Autumn forbade the electricity utility, ENEL, from participating in nuclear projects overseas (as it had done in Superphenix). This makes it difficult for Italy to take an equity stake in a European demonstration reactor, though it intends to continue to participate industrially and in R&D.

(v) The EFRUG Initiative

13. Due to disagreement between the French and Germans about the siting of the first of the three demonstration reactors envisaged at the time of the MoU, the European Collaboration reached an impasse. In attempt to take things forward, the European Fast Reactor Utilities Group (EFRUG - of which CEGB is a member) has initiated work on a common European model - EFR, the European Fast Reactor. This will involve the design companies and the R&D organisations in a five to six year programme of work to produce a design acceptable to the utilities. This will take into account and develop the best features of current designs (CDFR in the UK, SPX 2 in France and SNR 2 in Germany).

14. The national design and R&D organisations will need to establish formal links if the opportunities offered by full collaborative working are to be taken. Agreements covering working arrangements and the transfer of intellectual property have been negotiated and are nearly ready for signature. Both the AEA and the National Nuclear Corporation have asked for Governmental approval for them to sign.

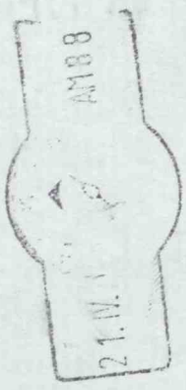
(vi) European Demonstration Reprocessing Plant (EDRP) Application

15. The AEA and BNFL's joint application for outline planning permission for EDRP at Dounreay was made to enable the UK to bid, within the Collaboration, for the reprocessing plant that would be necessary if the three demonstration reactors were to be built. This is now most unlikely to happen in the timescale envisaged at the time of the application.

(vii) Other countries

16. Japan, the USSR and the US continue to fund large fast reactor programmes. Japan in particular is spending about four times as much as the UK at present. It is bulding a prototype reactor which is due to be commissioned in 1992 and plans to build a commercial-scale reactor thereafter. Its long-term aim is to introduce fast reactors commercially by about 2020 - 2030.

Department of Energy
22 April 1988


A188
21.11.12

Nigel

S/Energy coming to
See PM 1430 - 1515
Monday 25 April

1

PRIME MINISTER

E(ST) are due to consider, as part of the scrutiny of the Department of Energy research programme, the Department's research into the Fast Breeder Reactor.

Mr Parkinson would like to have a word with you about the future of the Fast Breeder before it is considered by Ministers collectively (either in E(ST) or perhaps in E(A)).

Agree to see Mr Parkinson?

N.L.W.

Yes

N. L. WICKS
18 April 1988

HK-CON-80

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CCB/S

Prime Minister 4

To note.

Caxton House Tothill Street London SW1H 9NF

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RA

RRCG 25/4

RRCG 15/4

The Rt Hon Cecil Parkinson MP
Secretary of State for Energy
Thames House South
Millbank
London
SW1P 4QL

Dear Cecil

April 14

HINKLEY INQUIRY

Flap

I have seen your letter of 14 March about this inquiry and the Prime Minister's comments about whether all the PWR inquiries could be dealt with simultaneously. I have sought the views of the Health and Safety Executive as to whether their Nuclear Installations Inspectorate would have the resources to cope. The line taken in this letter is based on an assessment by John Rimington, HSE's Director General, and I am sure that it is right.

The inquiries are intended to deal with local issues. The Sizewell inquiry in practice acted as a forum for a debate on national policy giving rise to a great many issues on which HSE/NII expertise was called for. Consequently, consumption of HSE's (scarce) resources, and particularly of the time of key officials, was very great. Clearly, HSE could not service several inquiries simultaneously if they were all like Sizewell.

In fact Sizewell resolved (though not to the satisfaction of the objectors) most of the generic issues connected both with national policy and with the PWR design. It also elicited CEGB's intention to replicate the Sizewell design, unless for site-specific reasons modifications are required.

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Had Chernobyl not happened, we could therefore have expected that the ensuing inquiries would have concerned purely local issues and not nuclear safety. NII believe it possible to declare the licenseability of each station taking account of site-specific issues before any of the inquiries begin, and though this consumes resources it does so manageably. If no more than this were required, the inquiry process could well be telescoped. Indeed, if it were accepted that only local and not nuclear safety issues were to be handled by each inquiry, so that NII's view on licenseability could be dealt with independently of the inquiry, they could then all be held simultaneously.

Because of Chernobyl it appears evident that the nuclear safety issue must have another major public airing, however this be contrived - whether at Hinkley Point or elsewhere. If this airing could be divorced from the "local" inquiries, or confined to only one of them, then so far as HSE/NII are concerned telescoping would be possible on the basis set I have described.

I am copying this letter to the Prime Minister, the Chancellor of the Exchequer, Nicholas Ridley, John MacGregor, and Paul Channon, and to Sir Robin Butler.

Yours ever

NORMAN FOWLER

ENERGY = Policy pt 12



CONFIDENTIAL

NJ

CBG

10 DOWNING STREET

LONDON SW1A 2AA

From the Private Secretary

5 April 1988

Dear Stuart,

ACOST REPORT: THE INDUSTRIAL IMPACT OF SIZEWELL B

The Prime Minister has seen your letter to me of 29 March and attached draft letter to Sir Francis Tombs. She is content with the terms of this response and for it to issue as a letter from your Secretary of State.

I am copying this letter to the Private Secretaries to the other members of E(ST), Alison Brimelow (Department of Trade and Industry), Nicholas Wilson (Department of Employment), Trevor Woolley and John Fairclough (Cabinet Office).

Yours,
Paul

Paul Gray

Stuart Brand, Esq.,
Department of Energy.

CONFIDENTIAL

SW

CONFIDENTIAL

MJ

cc BG

10 DOWNING STREET

LONDON SW1A 2AA

From the Private Secretary

5 April 1988

Dear Stephen,

FUSION: RESEARCH COUNCIL ON 11 APRIL

The Prime Minister was grateful for your Secretary of State's minute of 30 March. She has noted the steps in hand concerning UK liability for the decommissioning of JET, and is content for the Chancellor of the Duchy to take the line proposed on the "tail" and the extension of JET to 1992 at the 11 April Council.

I am copying this letter to the Private Secretaries to the other members of E(ST), Peter Smith (Chancellor of the Duchy of Lancaster's Office) and to Trevor Woolley and John Fairclough (Cabinet Office).

Yours,
Paul

Paul Gray

Stephen Haddrill, Esq.,
Department of Energy.

SK

CONFIDENTIAL

cc BF

DEPARTMENT OF TRANSPORT
2 MARSHAM STREET LONDON SW1P 3EB

My ref: C/PSO/3672/88

Your ref:

The Rt Hon Cecil Parkinson MP
Secretary of State for Energy
Thames House South
Millbank
LONDON
SW1P 4QJ

31 MAR 1988

NBPM
RRCG
6/4

Dear Cecil

HINKLEY INQUIRY

Thank you for copying to me your letter of 14 March to Nicholas Ridley.

I agree that an inquiry which runs as long as that at Sizewell should be avoided if at all possible. From our point of view, Layfield fully accepted the transport safety case and no new regulatory issues should arise in respect of Hinkley.

I am broadly in agreement with your Rule 5 statement, although I would hope that the Inspector will restrict detailed transport investigations to "local" issues, eg the arrangements for moving irradiated fuel flasks between the power station and the existing railhead at Bridgwater, a distance of some 11 miles including Bridgwater town centre.

My officials would, of course, be happy to give evidence if asked to do so.

I am copying this letter to the Prime Minister, Nicholas Ridley, John MacGregor, John Major, Norman Fowler and to Sir Robin Butler.

Yours,

Paul

PAUL CHANNON

ENERGY policy pt 12

PRIME MINISTER

ACOST REPORT: THE INDUSTRIAL IMPACT OF SIZEWELL B

The letter from Mr Parkinson's office of 29 March provides a draft response to the ACOST Report. John Fairclough is content with it.

You have already agreed that the report itself should be published. This is now scheduled for 13 April.

Content with the terms of the draft Government response, and for the suggestion that this should be issued in Mr Parkinson's name rather than yours?

PAUL GRAY
31 March 1988

DASAJV

B. Prime Minister

Content:

① (this page) to note the progress on de-commissioning costs?

② (next page) to agree to hold out on the "tail" and JET extension to 1992 at the 11 April Council?

Prime Minister

Yes

Yes

FUSION: RESEARCH COUNCIL 11 APRIL 1988

PRCG 31/3

Since we discussed fusion in E(ST) on 26 January, discussions have continued in Brussels on the draft text of a new Community Fusion Programme for 1987-91 and the proposed JET extension to 1992. The only substantive matters now outstanding on which there are UK reserves, are the size of the "tail" (expenditure which cannot be incurred until after 1991) and the extension of JET's Statutes till 1992 (on which we have placed a reserve until the question of the "tail" is resolved). Both are on the agenda of the Research Council meeting on 11 April, which Kenneth Clarke is to attend.

In E(ST) on 26 January we decided on a number of actions to help reduce the cost to the UK of the Community's work on fusion; the largest of those costs is, of course, our liability for the decommissioning of JET. Since then, we have made some progress. My officials have discussed the problem of decommissioning with officials of both the European Commission and of the South Oxfordshire District Council. As expected, the Commission response has been cautious, but it does not rule out the possibility of Commission support in due course for some kind of joint programme in relation to the first steps of JET decommissioning. In the case of South Oxfordshire, although it will be 4-6 weeks yet before we can expect a formal reply, the initial response from officials to the case for an extension of the planning condition was reasonably encouraging. If the Council accept the case for extending the planning condition, the estimated cost of decommissioning would be halved - and largely deferred until the second decade of next century. We have also secured a commitment from the Commission to join us in inviting the JET Council to formulate clear technical milestones by which progress on JET can be judged and on which the decision to introduce tritium will be based.

As for the "tail", the Presidency now propose a figure of 48 mecu, compared with the Commission's original proposal of 20 mecu, and with the 98 mecu for which we have been pressing. UKREP's assessment is that everyone else will be ready to accept this figure at the Research Council. We therefore need to decide our line.

I do not think we should agree to a figure as low as 48 mecu, and suggest that, while we may at the end have to come down a bit to secure agreement, at this stage we should continue to hold out for the full 98 mecu, deploying the arguments which we have consistently used about the desirable size of the fusion programme over the 1987-91 period, and the need to accord the fusion programme a "tail" of similar size to that being applied to the Framework Programme as a whole. Apart from our wish to secure agreement at 98 mecu, I should prefer to avoid a settlement of the extension to 1992 at this stage, in order to allow time to bring the exchanges with the Commission and South Oxfordshire to the best possible outcome. I would in fact hope that further progress between now and June will enable us to reach agreement at the Research Council in that Month.

I have considered the tactical advantages of offering some slightly lower figure than 98 mecu on 11 April, pitched at a level which, while still too high to enable agreement to be reached, might forestall criticism that we alone are blocking progress. For the present, however, I think we should stick where we are. Offering such a figure now would create a new, lower ceiling for future negotiation on the tail, and - because it would be seen to be meagre - would not stop those who wish to criticise us from doing so.

I am sending copies of this minute to Kenneth Clarke, the other members of E(ST), to Sir Robin Butler and to Mr Fairclough.

C. P.

Secretary of State for Energy
30th March 1988



Qn 0464

MR GRAY
10 Downing Street

cc Mr Woolley

31 March 1988

ACOST REPORT: THE INDUSTRIAL IMPACT OF SIZEWELL `B'

My advice would be that the response and handling proposed in Stuart Brand's letter of 29 March are satisfactory.

2. The publication date being proposed is 13 April and the Cabinet Office Press Office has been asked to liaise with the Press Office in the Department of Energy over arrangements for releasing the Report and the press notice containing the text of the response.

JOHN W FAIRCLOUGH

pp

ENERGY Policy pt 12

cc BG (attached)

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

Paul Gray Esq
Private Secretary to
The Prime Minister
10 Downing Street
LONDON
SW1A 2AA

29 March 1988

Dear Paul,

ACOST REPORT: THE INDUSTRIAL IMPACT OF SIZEWELL B

In my letter of 23 February I said that we were working on a draft response to the ACOST report, to be made at the same time as publication of the report. Now that my Secretary of State has made his announcements on ESI privatisation and the Hinkley Point 'C' Inquiry, the way is clear for publication.

I attach the draft response. It has been prepared in consultation with other Departments but in fact most of the issues are for my Secretary of State, particularly those which need a firm reply. Mr Parkinson therefore suggests that the response should be in the form of a letter from him. This would be placed in the library of the House, that fact being announced in answer to a written PQ, and the text would be published in a press notice.

I should be grateful to know if the Prime Minister is content with the terms of the response and the way we propose to handle it.

Copies of this letter go to Alison Brimelow (DTI), the Private Secretaries to the other members of E(ST), Nicholas Wilson (Department of Employment) Trevor Woolley (Cabinet Office), and John Fairclough (Cabinet Office).

Yours sincerely,

Stuart Brand.

STUART BRAND
Private Secretary

CONFIDENTIAL

DRAFT LETTER TO SIR FRANCIS TOMBS

ACOST REPORT: THE INDUSTRIAL IMPACT OF SIZEWELL B

The Government is grateful to ACOST and to the members of the study group for their work in producing this report.

Many of the report's findings and recommendations concern matters which are for the electricity supply industry, the nuclear industry and others, rather than for Government. This response concentrates on those issues of specific concern to the Government.

Future Public Inquiries

I note ACOST's view that "there is no justification for future public inquiries into matters relating to the nation's nuclear power programme being as time-consuming as that considering the construction of the PWR at Sizewell because the main issues have now been adequately examined". In setting out those matters which I consider likely to be relevant to my consideration of the CEGB's application to build a PWR at Hinkley Point in Somerset, I drew attention to the conclusions on nuclear safety from the Sizewell Inquiry.

ACOST draws attention to the effects on the economics of the nuclear programme of delays in ordering due to very long planning inquiries. The Electricity Generating Stations and Overhead Lines (Inquiries Procedure) Rules 1987 are designed to make the inquiry process as efficient and effective as possible while not impairing in any way the fairness and impartiality of the proceedings, or the ability of participants to make representations which are relevant to the decision. A non-statutory code of practice, dealing in the main with pre-inquiry procedures will also apply at future power station inquiries. Its purpose is to enable the inspector to ensure that the inquiry runs smoothly and to help participants to concentrate on the real issues.

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Effect of Sizewell B on UK manufacturing industry

ACOST has drawn attention to the worldwide nature of the market for PWR components. It is encouraging that the CEGB expects that more than 90% by value of the contracts for the hardware for Sizewell B will be allocated to UK firms.

Manufacturers will have noted our intention set out in the recent White Paper on Privatising Electricity (Cm 322) of placing a statutory obligation on the distribution companies to contract for a specified minimum proportion of non-fossil-fuelled generating capacity. I note ACOST's view that a PWR designed to UK standards of safety would constitute a significant point of reference for specialist component suppliers in furthering their opportunities in world markets. Taking both these points together, I believe that PWR construction, maintenance and repair offer a major opportunity for UK industry both at home and abroad in the years to come.

The Report draws attention to the employment created by Sizewell B, which at its peak of construction effort will provide about 15,000 jobs. Many more jobs, particularly in the North of England and Scotland, would be created if UK industry competes successfully for PWR business overseas.

R&D

The Government notes ACOST's assessment that substantial R&D expenditures are still required for the AGRs and that the PWR benefits from its more advanced stage of development and from the collaborative links which are made possible by its worldwide presence.

With regard to the Fast Reactor ACOST discusses the importance of the full involvement of the ESI in the decision-making process. The generating boards are fully integrated into the management structure of the UK Fast Reactor programme. Since April 1987 the CEGB has been contributing some 30% of the funding of the programme with the UKAEA and has been acting as joint customer with the Department of Energy. Within the European Collaboration the CEGB has been playing a full part in recent successful moves towards greater integration of utility requirements and design efforts.

Arrangements for R&D in the privatised ESI, including the sponsorship of Fast Reactor research, have not yet been decided.

CONFIDENTIAL

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Arrangements for R&D in the privatised ESI, including the sponsorship of Fast Reactor research, have not yet been decided.

I agree that an adequate supply of skilled manpower is vital to the success of UK PWRs. This issue is being addressed by the industry's own training programmes, and the Government's education and training initiatives.

Safety

Safety must always be paramount in the production of nuclear generated electricity. The safety record of UK nuclear power generation is second to none.

I attach great importance to maintaining the Health and Safety Executive's Nuclear Installations Inspectorate as an independent and effective supervisor of nuclear safety. I welcome ACOST's statement that the NII's expertise is recognised and well respected.

NII's staff resources have increased and their work has developed and will go on developing. The Inspectorate have played an important role within the HSE in preparing the discussion paper on "The Tolerability of Risk from Nuclear Power Stations" which has recently been published. This paper includes material on human factors and on cost/benefit analysis in line with recommendations in the Layfield Report. The Inspectorate is also increasing its role in international safety discussions, both through the International Atomic Energy Agency and through bilateral contacts with other countries.

The NII have stated that they expect to be able to make a statement on the licensability of the Hinkley Point C station design this June; and a similar timing of such statements in regard to future nuclear stations should much reduce the potential uncertainties for both utilities and design and construction companies which ACOST have identified.

Replication of the PWR

ACOST comments on the value of an ordering programme that takes account of the experience being gained on Sizewell B and of the industrial benefits of standardisation and replication. ACOST recommends that the privatisation of the ESI ought not to impede continuity of PWR construction.

I believe that by leaving the existing nuclear stations in the hands of a substantial company which will inherit all of the CEGB's nuclear resources, the new structure will ensure continuity and high standards in the management of the nuclear programme.

Project Management

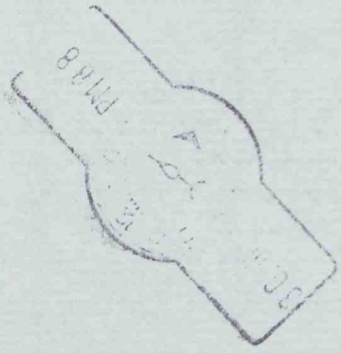
Our proposals for the structure of the privatised ESI include the division of the generating side of the CEGB into two separate companies. It will be for these successor bodies and the other private generators which the Government hopes will enter the new competitive electricity market to decide the future arrangements for the design, procurement and construction of new stations.

The future of the CEGB's Generation Development and Construction Division at Barnwood is one of the many detailed matters that we will be discussing with the CEGB in the coming months in the light of the White Paper proposals.

NNC is a private sector company and its future is not within the Government's control. Discussions about the disposal of the UKAEA shareholding in NNC are under way.

SECRETARY OF STATE FOR ENERGY

Energy - Friday PM2.



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ADVISORY COUNCIL ON SCIENCE AND TECHNOLOGY

"THE INDUSTRIAL IMPACT OF SIZEWELL`B'"

A REPORT
ON THE INDUSTRIAL IMPACT OF
POST-SIZEWELL NUCLEAR REACTOR POLICY

THE INDUSTRIAL IMPACT OF SIZEWELL `B'

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CHAPTER 1...EXECUTIVE SUMMARY AND RECOMMENDATIONS

1.1. Following the publication of the report of the Sizewell `B' Public Inquiry, chaired by Sir Frank Layfield, and the subsequent Government decision to authorize construction of a pressurized water reactor (PWR), the Advisory Council on Applied Research and Development (ACARD), (which subsequently was reconstituted as the Advisory Council on Science and Technology (ACOST)) set up a Working Group to examine the industrial implications of the future UK nuclear programme.

1.2. The primary objective of the Working group was the quantification of the effects of the introduction of a non-UK design of reactor upon employment, the availability of skilled resources, and on imports and exports. Its underlying rationale was to complement the Public Inquiry report, using its conclusions as the starting point. Government support for nuclear power generation has been assumed throughout this study, in addition to its resolve to privatize the Electricity Supply Industry (ESI).

1.3. A nuclear programme requires a high level of investment in manufacturing infrastructure and in order to develop and maintain the long-term efficiency of the nuclear industry we recommend that clear priority is given to the ordering of plant at a rate which allows for the development and retention of the necessary skills and technologies, allied with an even loading of manufacturers` facilities. The full economic benefits of a programme will not be realized without strictly controlling the evolution of the design, approaching complete replication.

1.4. In these circumstances it is essential to concentrate for many years on the provision of only one thermal reactor design. We agree with the Central Electricity Generating Board (CEGB) that efforts should be directed towards the construction of the PWR now that the decision to proceed with Sizewell `B' has been taken. Although sufficient resources must be allocated to achieving the safe and efficient operation of the Advanced Gas Cooled Reactors (AGR), we consider that there is no point in spending extra money in maintaining the option for the construction of further AGRs.

1.5. The decision to build an internationally accepted design of reactor has potentially exposed British manufacturing industry to an increased degree of foreign competition, a position which could become even more evident in the future if the European Community (EC) removes some of the energy sector trade restrictions which exist between EC countries. UK industry is expected to obtain contracts worth 93% of the value of the hardware for Sizewell `B', of which most, but not all, will probably be spent in the UK. It should be able to compete for an even higher fraction for future PWRs if steps are taken by manufacturing industry to identify those power station components which are currently imported, with a view to providing the necessary investment in facilities and technologies to enable domestic production.

1.6. The choice of a PWR will not have a large impact upon total UK employment. The fact that the UK is able to manufacture PWR components should increase the long-term opportunities for those companies exporting PWR equipment and services, particularly those items which require technical endorsement within a PWR environment. The development and subsequent maintenance of a competitive domestic industry producing PWR components should also prove beneficial in the export market for the upgrading and repair of existing overseas stations. Success in the export market will depend upon the ability of UK companies to be internationally competitive and upon the maintenance of a design within the UK which is compatible with the mainstream of PWR development.

1.7. The introduction of a reactor type new to civil nuclear power in the UK has so far not necessitated substantial increases in skilled manpower resources dedicated to research and development (R&D), or design, or for licensing purposes. This is, in part, due to the availability of a large body of data from overseas PWRs and some redistribution of manpower away from gas-cooled nuclear R&D. The core of nuclear expertise originally developed for gas-cooled reactors has, so far, required only limited expansion to accommodate the different technology unique to the PWR design. However, if there is not to be a shortage of skilled engineering manpower to carry out the future nuclear programme, there will need to be special training given to overcome problems arising from the low level of construction over the last decade, combined with an adverse balance between recruitment and retirement.

1.8. The Government has a responsibility to underpin long term ventures in power generation. That has included the development of the fast reactor, the basic technical and engineering feasibility of which has been demonstrated. The investment of public funds in design and R&D for this system has been considerable.We also note, with approval, that funding of the fast reactor project is increasingly being transferred away from Government to the CEGB in recognition of the fact that this technology is approaching commercialization, and recommend that this process should be accelerated. The question of the possible transfer of responsibility for the fast reactor from UKAEA to the utilities is a matter which requires addressing simultaneously with the privatization of the ESI.

1.9. We believe that the Nuclear Installation Inspectorate (NII) should be able to maintain a sufficient cadre of engineers and other relevant skills to carry out its important functions without imposing delay at any stage in the construction of a nuclear power station. We consider that,in addition, it would be advantageous for the NII to increase the account it takes of factors such as the human element (prominent since Chernobyl) and to take a full part in discussions on the development of international standards of safety assessment. It is also important that the Health and Safety Executive (HSE) and the NII should pursue the recommendations in the report of the Sizewell `B' Public Inquiry towards an increased economic discipline on assessment criteria. In addition, we recommend that in the future the NII provides utilities with a clearer knowledge of the requirements under which a design will be licensed, and that opportunities be taken to move towards a more definitive statement of design requirements; that is to a more prescriptive mode of the ALARP (As Low As Reasonably Practicable) principle.

1.10. Since the Working Group was set up, the Government has announced its resolve to privatize the ESI. Whilst no specific proposals for this have been published, we have taken some aspects of this development into account. We consider that the Government`s commitment to nuclear power cannot be fulfilled unless it ensures that after privatization utilities which possess nuclear

plant have the technological resources, capitalization and tariff structures necessary to retain such capacity as a safe and economically attractive option and that account is taken of the future market structure of the manufacturing and engineering industry serving the nuclear programme.

1.11. The project management arrangements instituted between the CEGB and the National Nuclear Corporation (NNC) for Sizewell`B' are not ideal for the long term. We recommend that, in the arrangements for privatization of the Electricity Supply Industry (ESI), consideration should be given to concentrating the relevant resources and management responsibilities in one organisation so that the design, procurement and construction of future civil power stations can be carried out to time and cost. The Government should regard the privatization of the ESI as a splendid opportunity to implement such a change in the industry`s market structure.

1.12. The detailed arrangements for such a design and construction (D&C) organization depend greatly on the manner of privatization of the ESI and this is a subject beyond our terms of reference. It is clear, however, that if a major utility is created possessing a strong financial, managerial and technological capability, a choice exists between the options of grouping the D&C expertise in a subsidiary of the utility, or embodying that expertise in an independent entity which would be fully capable of designing and arranging the procurement of nuclear stations and which would operate on a commercial client-customer basis. The latter option would be more suitable if the ESI in England and Wales was divided into small units. We make no specific recommendations regarding the choice between these options but in any case see no reason for the Government to hold a substantial stake in any design and construction company. We recommend that, even if the electricity generation and distribution organizations are retained in the public sector, the Government`s shareholding in NNC should be released into the private sector. We make no recommendations on the manner of the release or the future ownership of the shares.

CHAPTER 2...FOREWORD

2.1. In January 1981 an application was made by the CEGB for the consent of the Secretary of State for Energy, under section 2 of the Electric Lighting Act (1909), to the construction of a PWR at Sizewell. Sir Frank Layfield QC was appointed as Inspector to hold a public inquiry into this application, with the following points being considered by the Secretary of State to be relevant:

a. the CEGB`s requirement for the power station in terms of the need for secure and economic electricity supply and having due regard to the Government`s long-term energy policy;
b. the safety features relevant to the design, construction and operation of the station and ,in particular, the views of the Nuclear Installations Inspectorate as the licensing authority;
c. the arrangements for waste management in the light of the views of the authorizing Departments;
d. the implications of the proposed development (including both construction and operation) for;
    i. agriculture and fisheries;
    ii. local employment;
    iii. water supply and disposal;
    iv. transport requirements
    v. coast protection;
    vi. housing and public services generally;
    vii. local amenities, and in particular, areas of special landscape value or nature conservation areas.

2.2. The report was delivered to Government in late 1986 and the decision to authorize the construction of a PWR was made in early 1987. The report (Ref 2.1), hereafter described as the Layfield Report, gave unequivocal support to the conclusion that there was a national interest in building the PWR and, with some minor qualifications, supported the CEGB`s overall case. In particular, the Inspector confirmed that building the proposed PWR was likely to be the cheapest way to maintain an economic and continuous supply of electricity.

ACARD identified the industrial impact of the resulting nuclear reactor policy as being of particular interest. Although the significance and authority of the Layfield report was noted, it was considered that the PWR decision could have effects on UK industry as well as on the shape of the future UK energy scene and ACARD therefore set up a Working Group to provide advice about these implications. Its composition was as follows:-

Lord Flowers (Chairman)	- Vice Chancellor, University of London,
Mr C Allday	- British Nuclear Fuels (retired Chairman and Chief Executive),
Mr J Collier	- Chairman, United Kingdom Atomic Energy Authority,
Mr J B Cook	- Engineering Manager, Shell UK Exploration and Production,
Sir Sam Edwards	- University of Cambridge Chief Scientific Adviser to the Department of Energy,
Prof I Fells	- Department of Chemical and Process Engineering University of Newcastle upon Tyne,
*Mr E A B Hammond	- General Secretary, Electrical, Electronic, Telecommunication and Plumbing Union,
Prof D C Leslie	- School of Engineering, Queen Mary College, University of London,
Mr M V Posner	- Secretary General, European Science Foundation,
*Dr A Rudge	- Research Director, British Telecom,
Dr N A Burdett	- Secretary.
Dr J E J Cottrill	- Assessor, Department of Trade and Industry,
and Mr J Guinness	- Assessor, Department of Energy

assisted the Working Group in the course of the study but did not take part in the drafting of the report's conclusions and recommendations.

* ACARD/ACOST Member

The work of the Working Group continued after ACOST had subsumed ACARD in August 1987.

2.4. The terms of reference for the study were:

"To assess the impact of future UK reactor policy, in the light of the Government`s decision to construct a pressurized water reactor at Sizewell, on the requirements for industrial R&D and on the resultant technological and commercial opportunities, taking particular account of:

(i) skilled manpower requirements for R&D within power station construction, operation, regulatory organizations and the fuel services;

(ii) the development of advanced manufacturing methods and the export potential for systems or components;

(iii) the opportunity costs of expending resources on development programmes for more than one reactor type."

2.5. This study was not required to examine the wider questions associated with the acceptability of nuclear power and has not attempted to do so. We have started our analysis on the premise that it is Government policy to maintain a nuclear power programme and that the PWR is the currently preferred option of the major electricity generating utility in the UK for its next construction phase.The underlying rationale has been to complement the Layfield Report, using its conclusions as the starting point for our analysis.

2.6. We consider that there is no justification for future Public Inquiries into matters relating to the nation`s nuclear power programme being as time-consuming as that considering the construction of the PWR at Sizewell because the main issues have now been adequately examined.

2.7. Since the Working Group was set up, the Government has announced its intention to privatize the ESI, and whilst no specific proposals for this have been published, we have taken some aspects of this development into account. If the Government commitment to nuclear power is to be fulfilled and if there is to be a continuing nuclear programme then it must ensure that, after privatization, utilities which possess nuclear plant have the technological resources, capitalization and tariff structures necessary to retain nuclear capacity as a safe and economically attractive option. In addition, Government must take account of the future market structure of the manufacturing and engineering industry serving the nuclear programme.

2.8. We wished to examine the consequences of the decision to build the PWR upon the national industrial and technological base, to ascertain whether there were opportunities for industry to develop and export new products, materials or manufacturing methods, and whether there would be resource implications regarding the requirements for safety, R&D or design. We consider these matters in Chapters 3,4, and 5. The effects of maintaining the capability for construction of both AGR and PWR are discussed in Chapter 6 and the advantages of replication of the PWR design in Chapter 7.

2.9. During our deliberations,it became evident that there were other matters of equal, if not greater, importance, relating primarily to the institutional arrangements for the design and construction of nuclear power stations and the processes by which these have developed over the previous decade or so. The history of the UK nuclear programme demonstrates the lack of a clear division of responsibilities between Government, the UKAEA and the utilities in respect of, for example, the extent of nuclear power generation in the UK, the choice of reactors, or the manner in which a nuclear station is purchased and constructed. We believe that this has been the root cause of the poor performance of previous UK nuclear programmes and note the difference in organizational and managerial arrangements for decision making in the UK with those in France where a highly successful nuclear programme is under way. Although the French mechanisms are more `dirigiste` than might be acceptable in the UK, they have influenced our own thinking regarding the removal of institutional blockages within the UK system.

2.10. If lack of stability in policies or technologies can explain the poor performance of the nuclear industry, then it is surely pertinent for us to question first whether the relevant decision making processes for the Sizewell PWR have been formulated specifically to avoid the mistakes of the past, and second whether they are likely to improve the prospects of the industry in the future. We note that many of the mechanisms which have been adopted for the construction of Sizewell, including, for the first time in this industry, technology transfer from a foreign company, are departures from previous practices. In Chapter 8 we examine whether the procedures for the the construction of the Sizewell plant adequately reflect the lessons of the past.

2.11. The Working Group arranged a series of meetings with companies and individuals with especial interest in the impact of the Sizewell `B' decision. The views of industry were also sought through questionnaires targetted at organizations directly involved in all aspects of nuclear power generation. This report is based on the discussions of the Group itself, the views of those consulted and subsequent consideration by ACOST.

CHAPTER 3...THE EFFECT OF SIZEWELL `B` ON UK MANUFACTURING INDUSTRY

Future plant requirements

3.1. The CEGB normally bases its construction programme for England and Wales on rolling forecasts of electricity demand, and, although there are uncertainties associated with such estimates, suggest that, by the year 2000, some 12GW of plant will have to be installed if demand continues to grow at the present 1.5% per annum.

3.2. Current CEGB plans for future plant are shown in Figure 3.1 which indicates that the coal-fired generating capacity will remain approximately constant. The increase in total capacity will be obtained predominantly by the construction of nuclear power stations, the initial tranche of which being PWRs of the Sizewell `B' design. In the period up to the end of this century, the CEGB will wish to construct up to 6 PWRs (of 1.1GW apiece) and about 3 or 4 coal fired stations (of about 1.8GW). Coal fired stations are already proposed for Fawley in Hampshire and West Burton in Nottinghamshire.

3.3. The other nuclear utility in the UK is the South of Scotland Electricity Board (SSEB) which possesses Magnox reactors at Hunterston `A` and AGRs at Hunterston `B' and Torness (the latter`s twin reactors are being commissioned), giving a current plant mix of 10% hydro, 60% nuclear and 30% coal.New coal capacity is expected to replace electricity lost through the eventual retirement of Hunterston `A` as well as to accommodate load growth and it is unlikely that any new nuclear generating capacity will be required before the next century.

Imports of components

3.4. One of our objectives was to ascertain whether the decision to build a PWR rather than an AGR is likely to have any significant impact upon the extent of imports of goods and services. This is of relevance since components for the PWR are fabricated in many countries throughout the world as a result of the generic PWR design having been accepted internationally. To some extent,

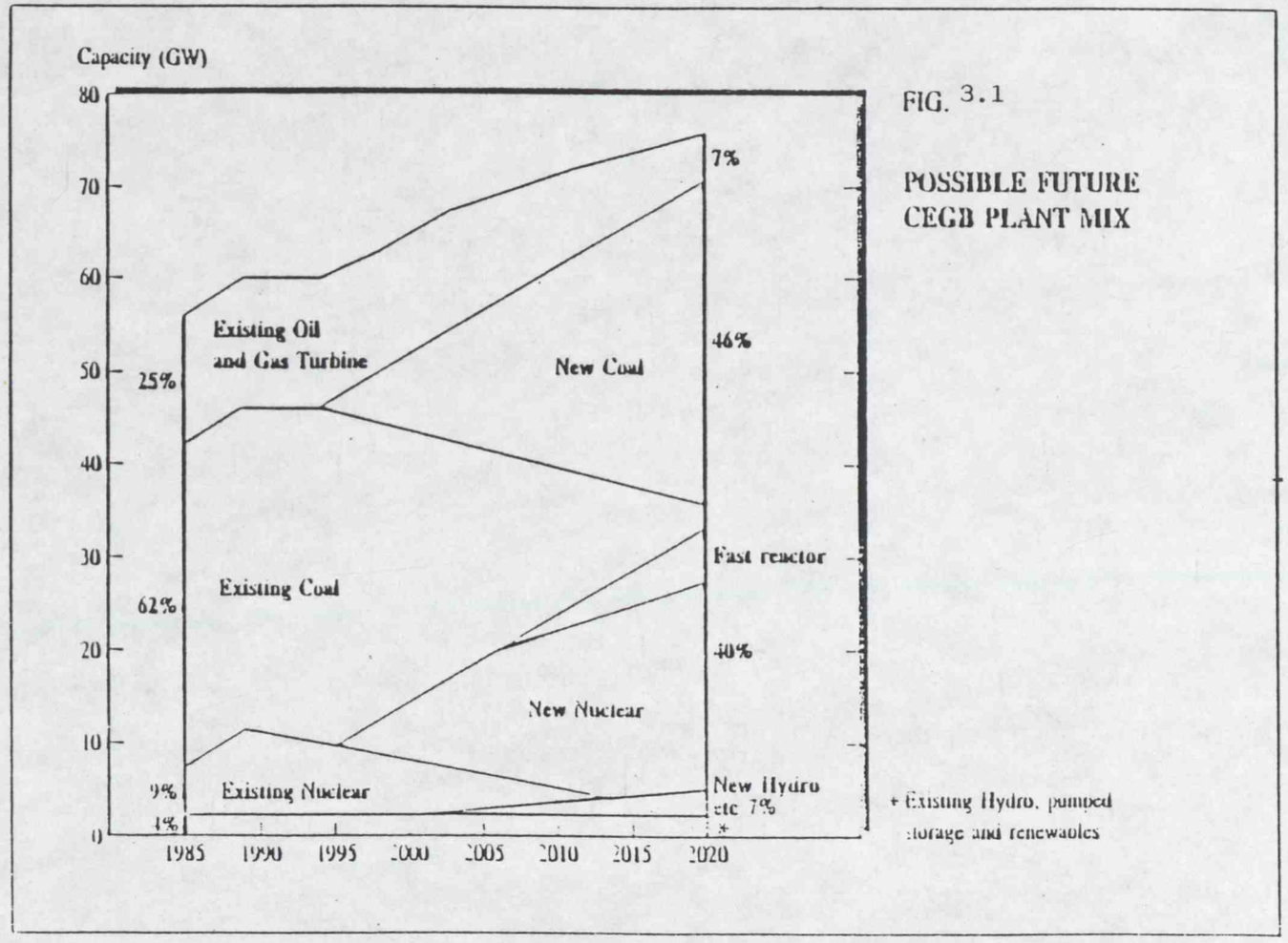

FIG. 3.1

POSSIBLE FUTURE
CEGB PLANT MIX

therefore, the CEGB`s procurement exercise was different from that for the AGR where the possibility of foreign supply of components for the Nuclear Steam Supply System (NSSS) was more limited.

3.5. Although Sizewell `B' will be the first civil PWR built in the UK,the import content has been reduced by the transfer of much of the technology from Westinghouse to UK companies, a process which could be facilitated by the formation of PWR Power Products (PPP), a joint NNC/Westinghouse company. In the case of the primary circuit, (total cost around £140m), Westinghouse have placed sub-contracts in the UK for components such as the main feed water pumps, the reactor coolant pump motors and some parts of the steam generators. These sub-contracts were the subject of competitive tendering between UK firms which could meet the necessary quality assurance standards. It is expected that fuel will be manufactured by British Nuclear Fuels (BNFL) who hold the relevant Westinghouse licence,although there is no commitment to future purchase beyond the initial charge. A list of the major contracts awarded for the construction of Sizewell `B' is appended as Annex A.

3.6. The CEGB`s expectation is that about 93% of the cost of the hardware for Sizewell `B' will be allocated to UK firms although the percentage of the plant actually constructed from UK materials and components will be somewhat smaller. In some cases (such as the forgings for parts of the primary circuit) the facilities for manufacture of specialized components to the exacting standards required by the design are not at present available within the UK. In other cases (such as the structural steelwork sub-contracted to a company in the Irish Republic) it is the commercial judgement of the UK contractor which has determined the origin of the supplies. Although the turbo-generators for Sizewell are to be built in the UK at a cost of about £100m, orders valued at about £11.7m will probably be placed outside of the UK for the forgings for some of the rotors and blades (£2.2m) and also for the condenser (£8.0m) and heater (£1.5m) tubes. In addition, many of the forgings for the components making up the primary circuit will come from abroad, with Japanese forgemasters taking about £5.5m of sub-contract business.

3.7. Contracts for the remaining 7% of the Sizewell hardware cost which have been let abroad include the reactor pressure vessel (RPV) (to be fabricated by Framatome of France) and the primary circuit (the contract being let to Westinghouse). The major items include:-

	£m (1982/3)
Reactor Pressure Vessel	8
Control Rod Drive Mechanisms	4
Reactor Coolant Pump (excluding motor)	8
Reactor Internals	7
Parts of Steam Generators	13
Generator Switchgear	3
Total	43

3.8. Babcock Power Ltd (BPL) have produced RPVs in the past (although mainly for the UK nuclear submarine PWRs which are considerably smaller than the Sizewell reactor) and they have expressed interest in establishing the facilities necessary for construction of the RPVs for the ESI. Although they have estimated the initial costs to be around £10m, an extensive series of trials would be necessary to prove their capability. A programme of the scale currently envisaged by the CEGB (up to 5 further PWRs in the first instance) would, if the pressure vessels were manufactured in the UK, therefore attract an oncost of £2-3m per reactor.

3.9. The Sizewell RPV will be manufactured in France by Framatome who have also been responsible for the construction of the RPVs for all the French PWRs. The Framatome factory is currently under-utilized because of the decceleration of the French nuclear programme and will be even more so in the 1990s when the Sizewell `family' is due to be constructed. Although UK manufacture of the pressure vessel for future reactors may be feasible,there would inevitably be keen competition for an indigenous manufacturer.

3.10. For Sizewell, Westinghouse will supply a number of key components for the steam generators such as the fully machined and clad tubesheets together with the fully formed tubes and baffle plates comprising the tube bundle. For future PWRs, it is expected that progressively more of the manufacture could be carried out within the UK if the requisite infrastructure is established. Consideration of the ease of fabrication of the other components imported for Sizewell suggests that there are prospects for UK firms to be able to compete successfully for contracts on future UK PWRs. Many of the manufacturers currently involved in the Sizewell project have PWR experience through the construction of nuclear submarine propulsion units and there are one, or possibly two, UK companies able to manufacture components such as control rod drive mechanisms (built by Westinghouse in the USA for Sizewell) to the exacting tolerances required on nuclear plant.

3.11. Many of the items listed in para 3.7. could be manufactured within the UK for future PWRs although the investment required to build the necessary infrastructure is large. For example, the cost of the facilities for the construction of the RPV exceeds the value of a single vessel and the jigs, fixtures and forming equipment necessary for the fabrication of the reactor internals would cost about one half of the value of a single set of these components. With the possible exception of the RPV, a programme of up to 5 further PWRs should be sufficient for UK manufacturers to invest in the necessary facilities to compete internationally for the contracts for most of the items listed above. Expenditure on this scale would, however, be justified in the UK only if the ESI could be certain of building a tranche of fully replicated PWRs and was able to select a single tender supplier who could in turn be assured of sufficient orders to recoup his initial investment.

3.12. In the absence of a declared national programme UK industry has, understandably, not invested extensively in design and industrial (as opposed to safety) R&D facilities for civil PWRs. This is beginning to change and several UK firms have seen potential profit in developing their technical capabilities in manufacture of PWR components such as reactor pumps, valves and forgings. Other development work for the PWR in this category includes the harsh environment test facilities at NNC, a valve test facility at the CEGB`s Marchwood Engineering laboratories and a rig being constructed at Weir Pumps to

enable full flow testing of the primary pumps. We consider that, if manufacturing industry acquires the necessary confidence in the continuity of the forthcoming construction programme for both conventional and nuclear power stations, there should be further opportunities for UK industry to invest in the relevant plant and technologies to become, and remain, competitive against foreign suppliers.

3.13. Future procurement practices of the ESI are likely to be affected by the policy of the European Commission to `complete the internal market` in 1992. This involves further measures to discourage discrimination against firms from other Member States by enforcing a greater degree of tender advertising and implementing procurement procedures designed to foster competition between firms in different States. From the narrow procurement angle, `completing the market` might be considered to be beneficial since it would increase the pressures for more competitive pricing upon UK manufacturers. The amount of imports for future UK power stations would probably be increased through the implementation of such a policy although, equitably applied across EC countries, it could also result in greater exports of power station equipment.

Export Potential for AGR and PWR Components

3.14. The previous UK nuclear programmes, based on gas-cooled reactors, have not, in the past, been successful in generating exports and it is highly unlikely that any AGRs will ever be sold abroad. Some of the technology involved, (for example that relating to graphite performance or gas circulator design) is applicable to, and has indeed been utilized within, the High Temperature Reactor (HTR) programmes in USA and Germany. The probability of the UK ever embarking on a major development programme for the HTR is, however, small and we conclude that that the potential for component exports for gas-cooled reactors is limited.

3.15. Evidence to the Layfield Inquiry from manufacturing industry was scarce but was generally supportive of the view that export potential would be enhanced by the successful construction of a PWR in the UK. Although some suggestions were made that the advent of the PWR would not increase exports (Ref 3.1), evidence from Lord Weir (Ref 3.2) indicated that businesses could be built up on the export of special components for nuclear reactors, especially PWRs, and that export orders would be more numerous and easier to achieve when a UK PWR could be used as a reference point. We agree and suggest that there is a reasonable chance that UK firms can win contracts for substantial amounts of PWRs being built abroad, provided that they are internationally competitive compared to foreign companies which possess larger manufacturing capacities and have established repuations in PWR design and construction.

3.16. However, only the largest utilities can now afford the 900-1300 MW units which appear to be the internationally standard size for nuclear plant. Countries sufficiently advanced to absorb a nuclear station of that size will wish to involve and develop their own manufacturing industry, possibly by instituting technology transfer arrangements similar to those established between the UK and Westinghouse. If the UK is to be in a position to export complete nuclear islands there must be a credible main contractor able to establish a successful track record in PWR construction.

3.17. The PWR has become an established system worldwide and the maintenance and repair of these stations represents a major part of the world market for electrical generating plant and related equipment. The market for PWR components will be substantial. Export possibilities probably exist in generating plant, electrical equipment, civil contracting and such reactor components as pumps, valves, instruments, controls and safety and chemical systems. Information is available (Ref 3.3) indicating that the 90 on-line PWRs in the USA spent about $1.6bn on maintenance in 1985. These data are not incompatible with French information on maintenance costs of about FF3.5bn for their 30 plant in commercial operation in 1984 (Ref 3.4), again suggesting a figure of about $10-15m per year per reactor. In the USA, where a high proportion of their PWRs have been operating for a significant length of time, it appears that yearly expenditure on replacements and upgradings of obsolete

plant items is around $20m per station. Such figures have to be treated with some caution since they may include labour and service costs, but they suggest an international market for contracted services for the PWR of the order of $3bn per year.

3.18. In assessing the opportunities for UK industry to penetrate the export market for maintenance services, it must be recognized that a large percentage of the contracts will be tied to the original suppliers of the plant. A PWR designed to UK standards of safety would, however, undoubtedly constitute a significant point of reference for specialist component suppliers in furthering their opportunities in world markets. This is of particular importance to the manufacturers of control, instrumentation and safety systems who currently have relatively few opportunities to offer equipment with a proven capability in the specific environment of a PWR nuclear system. The technical endorsement provided by the Westinghouse licence should contribute benefically, facilitating the export of items for the primary circuit.

3.19. It is to the credit of UK industry that a number of British firms have in the past been successful in obtaining contracts for plant and components within PWRs and similar systems overseas. For example, Northern Engineering Industries (NEI) have exported 10GW of wet steam turbines for the CANDU reactor and the Turbine Generators Division of the General Electric Company (GEC) have a good record of exporting turbines for PWRs. To a large extent this has been due to the policies of both of these firms to orient their efforts towards the world market and not to rely on the domestic one because of the recent shortage of UK orders. A list of contracts carried out by UK firms for foreign PWRs is appended at Annex B.

3.20. We conclude that, since the UK domestic nuclear programme is now devoted to a reactor design which is compatible with those erected and operated elsewhere, the British capability in PWR steam system technology will increase the opportunities for exports for both PWR NSSS components and conventional equipment. It is possible that in the short term exports might be limited to items, including design and engineering skills, which are not critically dependent on technical endorsement in British PWR stations. In the longer term, however, the successful implementation of the Sizewell project will represent a useful UK base for additional business overseas. It should allow the maintenance of a UK design within the main stream of PWR developments. This, together with a build up of R&D and manufacturing capacities in UK companies should enable them to succeed in world markets if they are able to remain price competitive.

3.21. In view of the fact that the equipment suppliers to the power generating utilities operate in a high technology industry with a high level of value added, we consider it essential that the UK`s capability in this industrial sector is maintained and, if possible, improved. It is also particularly important for the nation to retain a strong domestic capability in view of the possible opening of the UK market to foreign competition through the EC`s proposals to `complete the internal market`. In the 1990s, the UK is likely to be amongst the leading EC constructors of power stations with a high level of demand for equipment, at a time when competitors` own domestic markets (especially that of the French) will be declining. Hence there will be large over-capacity in Europe ready to exploit any possibilities opened up by the UK demand.

Employment created by Sizewell `B'

3.22. The construction of any power station provides business for a wide sector of the UK`s manufacturing and construction industries. Assessments made in 1982 (Ref 3.5) indicate that the Sizewell project would require the services of between 50,600 and 61,800 man-years of effort in direct employment with possibly another 20,000 being maintained through the `multiplier` effect of the injection of funds into the UK economy. These estimates may be considered to be low since they slightly underestimated the proportion of the NSSS being constructed in the UK. Such data are not incompatible with the current CEGB estimate that, on average, about 10,000 jobs will be maintained for seven years in Britain`s industry and on site. At its peak in 1990 or 1991, the project will provide about 15,000 jobs, including about 3000 on site. Of the latter, about 1200 will be filled by people having permanent housing within daily travelling distance of Sizewell.

3.23. We have not attempted here to undertake a detailed study of the macro-economic aspects of the construction of Sizewell `B'. Neither have we evaluated the impact that a large public sector investment may have upon potential capital shortages and the economy as a whole. We note that some attempts have been made to gauge the impact of a nuclear power programme upon employment within the UK (particularly in the mining sector) (Ref 3.6), and the relative effects of alternative investments in the energy sector(Ref 3.7). Such efforts are insufficiently precise to be of much direct value to the ACOST exercise.

3.24. Similarly, we have not attempted to differentiate in depth between the employment levels maintained by a tranche of PWRs and that for a tranche of AGRs. Since the employment generated by such capital projects is approximately proportional to the total expenditure in the UK and, if we accept the relative costings given in the Layfield Report, it is reasonable to surmise that total UK employment for the PWR option will be slightly lower than that for AGR. On the other hand the enhanced prospects for PWR components which could result from the successful construction of a PWR, rather than an AGR may be beneficial to employment provided that companies and their component or system designs are internationally competitive.There are also wider economic benefits to be obtained through the supply of cheaper electricity to the nation.

CHAPTER 4...R&D RESOURCES

Organizational Arrangements - Thermal Reactors

4.1. The customers for R&D related to thermal reactor operation in the UK are: the utilities (for work associated with their current and future programmes); the Department of Energy (DEn) (for work associated with nuclear safety matters) and BNFL (for work associated with the nuclear fuel cycle). R&D is carried out in the research laboratories of the utilities and BNFL and by the UKAEA and NNC under contract. The UKAEA role is to maintain an independent body of expertise on AGR and PWR safety issues funded by DEn, but a substantial amount of contract R&D work is also undertaken for the CEGB and SSEB under the Thermal Reactor Agreement (TRA).This research relates to about £25m worth of the UKAEA generic research related to thermal reactors which was previously wholly Government funded. Table 4.1 shows the breakdown of the UK nuclear R&D expenditure for 1987/88, categorized by funding source and reactor type.

4.2. R&D for the 14 AGR and 24 Magnox reactors in service or under construction in the UK is nationally coordinated. This is achieved through collaborative committees in the major technical areas which are themselves steered ,for the the AGR by the AGR R&D Requirements Committee. This is chaired by the CEGB and has senior staff from CEGB, SSEB, NNC, BNFL and UKAEA as members. Much of the AGR and Magnox R&D is applicable to either type of reactor. Currently, over 700 professional scientists and engineers are involved in the Gas Cooled Reactor R&D Programme with the CEGB and SSEB playing the dominant role in accord with Government policy which considers that R&D funding should be borne by the ultimate user.

4.3. The research priority for Magnox stations is to maintain their performance whilst retaining a high standard of safety. Long term safety reviews which will require substantial and probably increasing resources are currently being undertaken for these plant, including the low probability ("beyond-the design basis") fault scenarios which attracted renewed interest following the Chernobyl accident.

4.4. The most successful of the AGRs, those at Hunterston and Hinkley Point, have taken nine years to bring up to their present level of performance but even so it will only be in 1993, when the core is fully loaded with a new type of fuel, that these stations will be able to achieve full design output. The main R&D objective for the operating AGRs is therefore to provide the technical base to improve their performance towards design levels whilst maintaining safety against increasingly stringent criteria. All nuclear reactor systems inevitably need large amounts of R&D resources at the initial stages of their development but for the foreseeable future AGRs will continue to require substantial R&D expenditure. There are, for example, extensive programmes related to on-load refuelling above 40% Maximum Continous Rating (MCR), roof and standpipe integrity, the thermal and engineering performance of boilers and the formation of carbonaceous deposits on fuel and boiler tubes. Each of these problems requires resources not only for resolution in the short-term but also to carry out assessments of their impacts on safety as well as on core and station life-time.

4.5. PWR research is conducted on a national basis through the the PWR Research Requirements Committee which acts as a focal point for setting the R&D requirements, maintaining long term strategy and coordinating activity between CEGB, UKAEA, NNC and BNFL. The objectives of the programme were initially concentrated upon supporting the safety case for the introduction of the PWR into the UK, providing a technical base of UK-derived information, establishing UK participation in international research programmes and identifying areas of priority regarding safety and plant availability. Since the establishment of the Project Management Team (PMT) (see Paragraph 8.13), the PWR R&D programme has been principally focussed upon the pre-operational safety report for Sizewell B and the requirements for commissioning and eventual operation of the unit although longer term work generic to PWRs is also being carried out. The PMT also supports, inter alia, major contracts for the development and validation of component inspection methods, the qualification of equipment under harsh conditions and the testing of safety equipment and valves.

4.6. The PWR is an international system and therefore extensive collaborative links have been established with overseas organizations who have an impressive volume of data and research experience related to the construction and operating characteristics of the PWR. The UK can take advantage of this database by carrying out its own programme and exchanging results with overseas organizations, thereby gaining access to research facilities which would otherwise be too expensive to maintain on a national basis. About £1.6M is currently spent each year in contributions to collaborative international agreements, divided approximately equally between CEGB and UKAEA. In addition there are a number of information exchange agreements, without financial payments,with the Nuclear Regulatory Commission (NRC) in the United States of America, the Electrical Power Research Institute (EPRI), Tennessee Valley Authority (TVA), Japan and the USSR. The value of information received from these international agreements in terms of data and access to overseas programmes is considerable. Such international cooperation is not possible with the AGR.

4.7. One such international cooperative project is the Steam Generators Owners Group (SGOG) which was originally set up in 1977 by 29 utilities, mainly from USA but also from Japan, France and Sweden, in response to the severe corrosion problems which were being experienced at that time in PWR steam generators. The CEGB joined SGOG in 1980 and also participated, with 47 other utilities, in a further programme initiated in 1983. CEGB has gained data from the programme itself as well as obtaining direct access to other utilities who were solving a variety of PWR steam generator problems. This information was used to support the Sizewell B safety case and has enabled the CEGB to influence and assess design changes which Westinghouse have incorporated in the Sizewell `B' steam generators.

4.8. It is difficult to compare the current R&D resource requirement for the PWR with that for the AGR since the two systems are at different stages of development. It might have been expected that the introduction of a new design of reactor to the UK would have necessitated a substantial increase in overall R&D resources deployed by the CEGB. This has not occurred because of the availability of considerable amounts of data from operational PWRs overseas and to internal redistributions of manpower within CEGB and UKAEA. The CEGB have stated, in their evidence to us, that the establishment of the core of nuclear

expertise originally designed to deal with AGR and Magnox R&D has so far needed only slight expansion to accommodate the extra problems which are unique to the PWR design. Were it not for the PWR, thermal reactor R&D resource requirements would probably have declined over the next few years.

Organizational Arrangements-Fast Reactors

4.9. The Government`s policy towards fast reactors was last reviewed in 1982 when it was considered that the existing development programme should be maintained to provide the UK with the option of series ordering once the technology became economically viable. The UK programme was considered to be best executed by collaborating with other interested European organizations and, to this end, an Inter-Governmental Memorandum of Understanding was signed in 1984 by the UK, Belgium, France, the Federal Republic of Germany and Italy. It was envisaged that there would be full industrial collaboration in a planned programme of reactor construction, reinforced by broad agreements between the utilities, R&D and design organizations and fuel cycle companies. The R&D carried out in the UK is part of this international programme and is managed by a European Steering Committee responsible for defining objectives and priorities. Coordination of the UK effort is achieved through meetings of representatives of the organizations comprising the UK nuclear and electricity generating industries, although the great majority of the effort is provided by the UKAEA who operate the 250MW Prototype Fast Reactor (PFR) at Dounreay and supply most of the R&D effort.

4.10. Government has a responsibility to underpin long term ventures in power generation and that has included the development of the fast reactor. R&D on this system is mainly carried out by the UKAEA and has in the past been funded primarily by Government. As shown in Table 4.1 total expenditure for the year 1987/88 is about £128m. In addition to funding the major part of NNC`s programme, the CEGB are now contributing some 30% of the UKAEA`s net expenditure (which is £102m in 1987/88) The level of R&D expenditure is considerably greater than the combined amounts spent on AGR and PWR although

this relative position is understandable considering the different stages in the development cycles of these systems. About half of the fast reactor R&D cost is associated with the operation of the Dounreay reactor and its associated reprocessing plant with some income being generated through sales of electricity.Comparisons with expenditures on AGR and PWR must take this factor into account.

4.11. It is essential that the ultimate users of fast reactor technology (the ESI) are sufficiently involved with its development to be able to make a commercial judgement on its viability. This implies that the ESI ought to have both a considerable input into the current decision making process and greater control over the future role of the fast reactor. There are indications that the CEGB is recognising this responsibility and is also cooperating actively with French and German utilities to achieve estimates of system viability. We also note, with approval, that funding of the fast reactor project is increasingly being transferred away from Government to the CEGB in recognition of the fact that this technology is appoaching commercialization, and recommend that this process should be encouraged. The question of the possible transfer of responsbility for the fast reactor from UKAEA to the ultilities is a matter which requires addressing simultaneously with the privatization of the ESI.

Availability of skilled resources

4.12. The general shortage of skilled manpower throughout the UK underlies any commentary on its availability within the nuclear industry. Professor Irvine of Manchester University summarized the situation when giving evidence to the recent House of Lords Select Committee on Civil R&D by saying, "the pool of qualified skilled manpower trained to undertake science and engineering research and capable of exploiting the new technologies...is grossly inadequate for the needs of the country" (Ref 4.1). There does not appear to be any immediate prospect of a significant increase in the supply of qualified scientists and engineers and current forecasts must be made on the basis of a maintenance of the current graduation rate.

4.13. Evidence presented to us from industry and the Professional Institutions suggests that there will not be a severe, immediate, shortage of available manpower in the fields of research, development or design as a result of the decision to change the direction of the nuclear programme from AGR to PWR. The CEGB have also argued that their R&D manpower totals have been scarcely affected by the PWR decision.In addition, the great majority of the design work for the PWR tranche has already been accomplished. However, if the PWRs are built too close together in time or if there is a significant, simultaneous, coal-fired power station building programme, there could be difficulties due to an inadequate supply of sufficiently well trained and experienced project managers and site personnel. (The need for a carefully planned phasing of construction is made again in paragraph 7.7)

4.14. The UK will need to maintain an adequate flow of skilled engineers into manufacturing industry in order to ensure that it has the capacity to keep up to world standards in the highly technological nuclear engineering sector. As the ESI approaches privatization there will be pressures upon industry to play a greater role in developing manufacturing processes and introducing the necessary levels of quality assurance procedures which will be applicable to future nuclear reactors. It is therefore critical that industry and Government recognize the need for skills in this area which, if neglected, will result in a flow of imports of PWR components as indigenous capabilities decline. Similar comments clearly apply to the production of PWR fuel where, for the first time, BNFL may be competing with foreign suppliers for the UK fuel services contracts.

4.15. The above considerations imply that most areas within the nuclear engineering sector will probably be in need of skilled personnel trained in all aspects of the PWR, especially if the future of the UK electricity generation is to be based upon this reactor type. There is a prevalent undercurrent of opinion amongst the Professional Institutions that retraining will be required to rectify the narrowness of application of many engineers operating in the nuclear sector. We note that the scale of the French nuclear programme has prompted the establishment of training centres specifically to provide designers, constructors and operators with the skills necessary to maintain the effectiveness of their PWR programme.

TABLE 4.1

Civil Nuclear R&D Expenditures (1987/88) by reactor type

	Source of funds (£m)			
Reactor Type	ESI(1)	DEn	Other(4)	Total
Magnox	6.8	-	-	6.8
AGR	32.5	11.3	22.2	66.0
PWR	39.6	6.6	1.3	47.6
Fast Reactor	35.8	75.2	16.7(2)	127.7
Steam Generating Heavy Water Reactor (SGHWR)	-	3.9	13.6(2)	17.5
General(3)	24.0	11.9	30.0	65.9
Total	138.7	108.9	81.8	330.4

(1) ESI data does not include capital expenditure

(2) includes receipts for electricity generated

(3) includes fuel cycle, generic nuclear and radiological protection research, nuclear materials management and support for facilities, but excludes disposal of radioactive wastes, decommissioning and research on the environmental effect of nuclear plant.

(4) Includes BNFL expenditure on fuel production and post-irradiation examination but not R&D on reprocessing.

CHAPTER 5..SAFETY

5.1. The licensing authority forexisting and future nuclear power plant in the UK is the Health and Safety Executive (HSE) and the task is carried out from day to day on their behalf by the Nuclear Installations Inspectorate (NII). It is for others to examine the methods and criteria by which it achieves its objectives, our intention being to ascertain how its procedures impact upon the economics of nuclear plant. Stringent safety and environmental requirements account for a substantial part of the cost of a nuclear power station and the NII'S expertise in the licensing of such a plant is recognized and well respected. We consider that it is essential that the Inspectorate continues to operate to this high standard otherwise the nuclear programme will be delayed, its economics impaired and public belief in it diminished. Although the NII has been uncomfortably short-staffed in the past, it is now substantially improving its strength following steps taken to bring salaries broadly into line with those offered by the power generating industry. It is important that the NII should be able maintain a sufficient cadre of engineers and other relevant skills, backed by the necessary managerial authority, to carry out its functions without delaying the construction of nuclear plant. We also consider that it would be advantageous if the NII increased the account it takes of factors such as the human element (prominent since Chernobyl) and to take a full part in discussions on the development of international standards of safety assessment.

5.2. The economic implications of a necessary level of safety in nuclear power generation are considerable although we recognize that there is a need for the risks to be reduced to very low levels. Our understanding is that in the application of the ALARP (As Low As Reasonably Practicable) to other forms of safety regulation, cost benefit techniques are frequently used to determine the levels at which such standards should be set. It is important that greater account is taken of economic implications of safety assessments of nuclear plant and we welcome the movement at the HSE and particularly within the NII towards implementing the recommendations in the Layfield Report (Ref 5.1) regarding an increased economic discipline on assessment criteria. We attach importance also to this being considered a feature of any progress towards the internationalization of safety standards, both as regards the PWR and fast reactor programmes.

5.3. Nevertheless, we believe that it will be necessary for NII to provide utilities applying for a licence with a clearer knowledge than has sometimes been the case in the past of the requirements under which the design will be licensed,so as to reduce inconsistencies and lead to a better utilization of resources amongst the assessors and the designers. Our understanding is that NII are now revising their Safety Assessment Principles in accordance with the recommendations of the Layfield Report (ref 5.1) and we suggest that, in the course of this revision, opportunities be taken to move towards what would amount to a more definitive statement of design requirements; that is to a more prescriptive mode of ALARP. Indeed it is our view that this is an essential prerequisite to the privatization of the ESI. A privatized utility could not accept the current uncertainty regarding the interpretation of ALARP, and would expect a much clearer statement of the HSE's licensing requirements at an early stage in the construction of the station. Similarly, it would be imprudent for any design and construction company to offer a fixed price for the whole or part of a station without ascertaining, in advance, the requirements of the Inspectorate, or even the time which they might take to reach a decision. This might in turn facilitate the use of cost and benefit techniques in relation to the safety parameters chosen.

5.4. The effect of increasing standards on the design of plant in an established series (such as that for the PWR in the UK) is also of concern in the same context, since alterations in safety requirements in the course of construction of a tranche of stations are likely to cause delays and could reduce the economic benefits inherent in plant replication. We note the NII`s evidence to the Layfield Inquiry when they made it clear that they had taken a deliberately conservative attitude to the licensing of Sizewell `B' so that there would be safety margins available to "operate as a reserve in favour of replication of the same design" (Ref 5.2). Such an attitude may be justifiable considering that Sizewell will be the first civil PWR in the UK, but it does emphazise the need for a more rigorous application of economic discipline to the safety criteria, possibly within a prescriptive framework for the tranche of units.

CHAPTER 6...REACTOR DESIGN CHOICE

6.1. In view of the fact that the CEGB`s application for Sizewell `B' involved the construction of a design of reactor new to this country it was necessary for Sir Frank Layfield to compare the economics of the PWR with those of the AGR. He noted that,although there had been improvements in the performance of the operating AGRs, there were inadequate data regarding Heysham II and Torness to determine whether the construction and operational difficulties which were the hallmarks of the early AGRs had been resolved satisfactorily. He did however suggest that if the performance of the AGR improved a reappraisal of reactor system choice might well be merited. The Secretary of State for Energy has however decided that there were no grounds for any reconsideration of the reactor choice and it has been accepted by the Government that the PWR is likely to have a lower lifetime cost than the AGR.

6.2. Sir Frank Layfield stated in his report that he felt unable to assess the consequences of granting consent for Sizewell B on the UK nuclear industry`s capacity to construct further AGRs since a decision in favour of a PWR at Sizewell could possibly lead to the eventual loss of the ability to construct an AGR. In their evidence to us the CEGB said that although there was no indication that the AGR had ended its useful life, they would prefer to see the investment in PWR exploited to the full. Their estimates suggested that lifetime costs of AGRs were some 20-30% higher than PWRs and they considered it realistic to exclude AGRs from their current programmes. An AGR design and engineering capability will be maintained until at least 1990. CEGB construction plans (described in Chapter 3) refer exclusively to PWRs and it would be reasonable to draw the inference that no more AGRs would be ordered by the CEGB.

6.3. The contracts placed by the ESI will enable NNC to keep an AGR team intact for support purposes for several years, although eventually the range of specialized skills and experience retained will become inadequate for building a new AGR. We were advised by NNC that, out of their current HQ workforce of 2000, 300 were AGR specialists with the remainder engaged on general power station engineering and project management (which was similar in work content

for AGR or PWR). We note in addition that NNC advised us that only a short period of familiarization is required for AGR specialists to be redeployed on PWR projects.

6.4. The resurrection of the capability to build further AGRs after a period of inactivity would result in a heavy financial penalty on the electricity consumer. Around £250m (1980 prices) was invested into the relaunch of the AGR programme at Torness and Heysham. Some £40m of this was allocated to special facilities at manufacturer`s workshops and subsequently recovered through the prices charged to the Generating Boards. It is to be expected that the majority of this £40m investment will be written off as the price to pay for the change from AGR to PWR, and the indications from industry are that this is a reasonable assumption to make. Similar manufacturing infrastructure costs would be incurred if, after a period of years, a decision were made to return to AGR construction.

6.5. The SSEB, in its evidence to the Layfield Inquiry, expressed a great deal of interest in the AGR probably reflecting the generally better performance of their AGRs compared with those in England. It is understood that the SSEB would probably be unwilling to introduce another reactor design on to its system if that were avoidable (Ref 6.1). However, SSEB would not require any new generating capacity for some years to come. If the rest of the ESI decide against retaining an AGR option, there will be a subsequent dispersal of design teams and erosion of AGR manufacturing capability. We believe that, unless a decision to build an AGR is made within the next few years, the disposal or re-utilization of the AGR infrastructure will necessitate the abandonment of this option. In view of the fact that the SSEB would not need another nuclear reactor on this sort of timescale, the chance that further AGRs will be built is clearly small.

6.6. The benefits of replication are only realized by building a tranche of units to the same design within a reasonably short period of time. Consideration of the UK`s future ordering rate therefore suggests that there is only room for one reactor design in the UK. A mixed AGR/PWR programme would involve extra launch costs for a new AGR design and duplication of manufacturing facilities, design and safety teams, together with a reduced ability to obtain the advantages of replication. Although there may not be any technological problems in such a hypothetical mixed programme, there would be associated financial and skilled resource constraints.

6.7. We consider that the likely future ordering rate for nuclear reactors in the UK is too low to support facilities for the construction of more than one thermal reactor system. The decision to proceed with a PWR rather than an AGR at Sizewell has effectively pre-empted the choice of reactor for the foreseeable future and we therefore suggest that there is little merit in maintaining the AGR option.

6.8. Although the resources currently allocated to preparing a new design of AGR are small, we recommend that these resources be transferred to PWR at an early stage. It is, however, noted that there are (or will be after the commissioning of Torness and Heysham II) 14 AGR reactors in service and it is essential that sufficient resources are allocated to these systems to ensure that they achieve their full design capability consistent with a safe and efficient operation.

CHAPTER 7... REPLICATION OF THE PWR

7.1. The establishment of a clear and consistent ordering programme based upon a standard, replicable reactor design must be a high priority for the long-term efficiency of the industry since such a policy lowers the overall cost of R&D and investment in capital equipment. Identification of problems during construction and operation of the prototype can considerably reduce total costs for later plant with financial benefits accruing to both utility and manufacturer.

7.2. The cost of the Sizewell `B' station includes the costs of launching the PWR and the costs arising from the delay in the sanctioning of the project due to the extended Public Inquiry process. The launching costs are those costs which arise from Sizewell `B' being the first of a kind which would not be incurred on a follow-on station. The main components of this include the development of the reference design and safety case, the support work carried out by Westinghouse and Bechtel during the transfer of the technology and the cost of developing design and project management systems specific to the PWR project. There were also costs associated with keeping the project running for an extended period during the Public Inquiry hearing and preparation of the Inspector`s report.

7.3. The launching and delay costs for Sizewell `B' have been stated by the CEGB to be about £250m at April 1987 prices and preliminary estimates for the next PWR at Hinkley Point have confirmed that savings of this magnitude can be achieved. There may also be additional cost reductions through the more efficient working which is implicit in undertaking a repeat station, and lower prices that may be forthcoming from contractors on repeat orders which do not have to include development costs.

7.4. The best example of the process of replication of a standard design is that of the French nuclear programme. Although much larger and more intensive than that proposed for the UK it is worth examination since the benefits of a standardization policy have been maximized.At present, 55 PWR reactors have been ordered in France since the initial unit in 1970. There are 34 900MW, 20 1300MW and 1 1400MW reactors either in service or under construction.All of the 900MW reactors have identical nuclear islands and there is also a large degree of commonality in the 1300MW series. Figure 7.1 indicates that standardization of a series of units can have a beneficial impact upon construction times, and hence probably the capital costs, of replicated plant although there are some local fluctuations in the overall trend. The success of the French programme was also aided by by the fact that they selected the PWR design towards the end of a period of substantial development in the USA during which the initial difficulties associated with the system had been overcome.

7.5. The French strategic model is also worthy of comment because a key feature of their strategy is the long-range plan for supply of components, fuel and reprocessing together with the identification of their prime contractors for the important areas of work, aiming throughout at the maximum degree of standardization and replication. Such a policy has required considerable cooperation and interdependence between Electricite de France (EdF) and its suppliers, such as Framatome, as well as a rationalization of parts of the French nuclear industry.

7.6. In contrast to the French experience, it is noteworthy that, for the UK`s Magnox and initial AGR nuclear programmes, orders were shared out amongst several different consortia which essentially developed their own ideas within a broadly similar design concept. The potential advantages associated with manufacturing a replicated design were foregone.

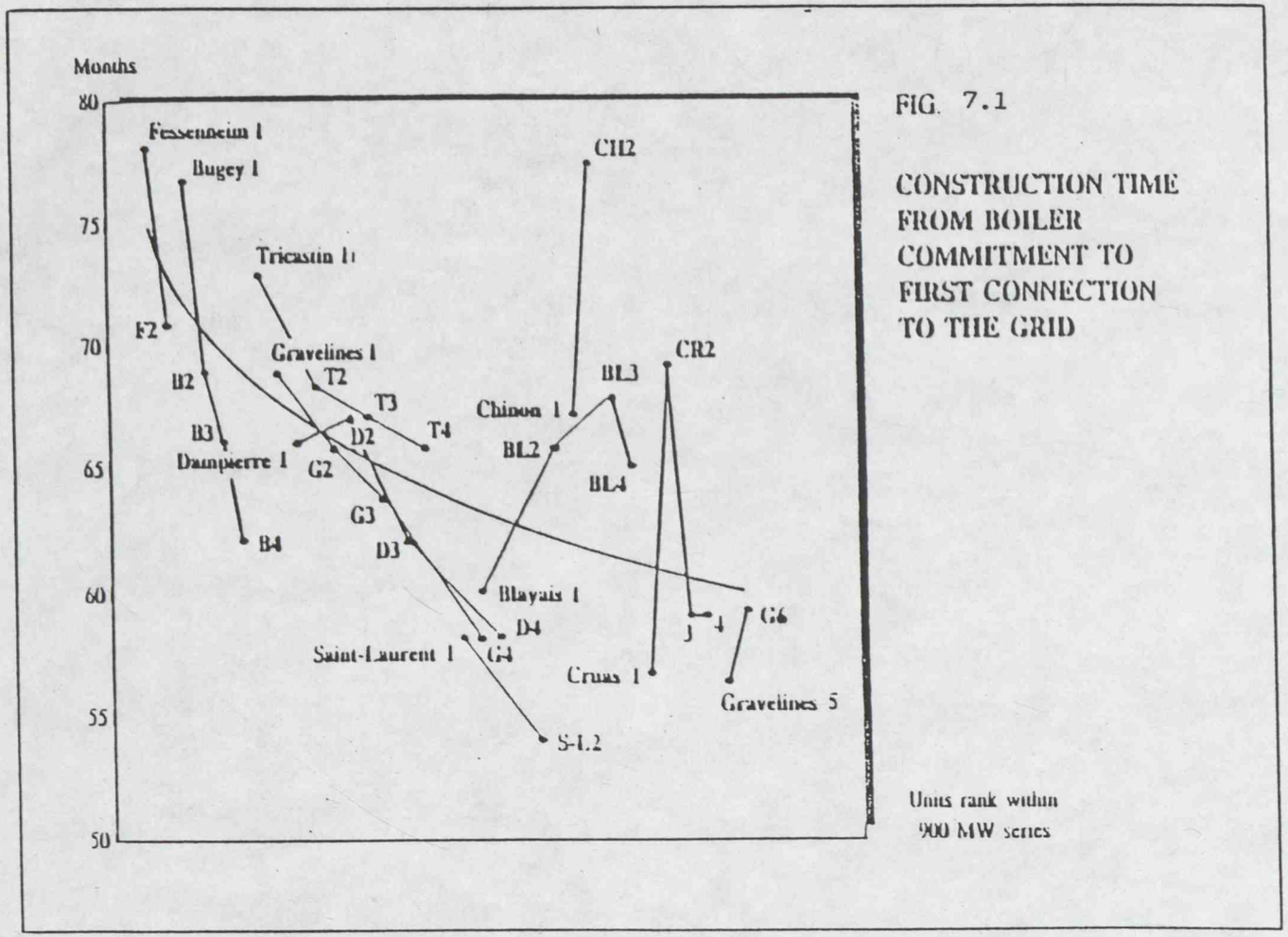

FIG. 7.1

CONSTRUCTION TIME FROM BOILER COMMITMENT TO FIRST CONNECTION TO THE GRID

7.7. The advice which the Working Group has received suggests that there ought to be a two to three year interval between Sizewell `B' and the following station intended to be at Hinkley Point. This would allow sufficient time for experience to be rationally incorporated into the design and construction procedures for subsequent stations and to allow for an orderly build up of the skilled teams and the manufacturing facilities required. Subsequent plant might then follow at slightly shorter intervals, of perhaps a year. This agrees reasonably well with the programme suggested by the CEGB.

7.8. We consider that a stable design for the system and its principal components is essential for the launch of a PWR industry. Very substantial resources have been injected into the launch of the Sizewell project and these should not be put at risk by introducing too many unproven components into the initial stations. We therefore welcome the intention to build the initial tranche of nuclear islands to the same design. Although the seismicity of candidate sites across the UK will vary, the specification of all the plant in the tranche to a particular excitation level would be a useful step in this regard. (Even so, the behaviour of the standard design on a particular site still needs individual assessment.) Sizewell B and the initial PWRs in the subsequent `family' will be constructed with twin 660 MW turbines which have many similar components to the current standard design utilized at other nuclear and fossil-fired stations. This will clearly reduce the requirement for development work to be undertaken simultaneously on the steam supply and electricity generation modules of the plant. The CEGB has suggested that it might wish to introduce a 1300MW turbine at a later phase of the Mark 1 PWR tranche although this ought to be implemented only after any initial difficulties with the nuclear side have been identified and corrected.

7.9. It has been suggested that "replication is only feasible for a limited tranche of stations programmed for sequential construction without a significant gap in the plant manufacturing programme" (Ref 7.1). A particular design of plant may be maintained for around five years before the combination of changes in safety criteria, efficiency considerations, manufacturing methods and the natural penchant of engineers and scientists to improve and modify a design necessitate the introduction of an upgraded version. We welcome the current intentions, first to limit the initial tranche of replicated PWRs to five or six, after which a Mark II version will be introduced, and second,

to attempt to build the PWRs which will follow Sizewell at approximately yearly intervals, after the initial 2-3 year gap in order to capitalize upon the manufacturing benefits of replication. It is important to note that the economics of the programme will be impaired if ordering is delayed due to very long planning inquiries or major changes in safety criteria during construction. The benefits of replication of the design are such that the privatization of the ESI ought not to impede the continuity of construction of the tranche of PWRs.

7.10. The power station construction industry, particularly that involved in nuclear plant, undertakes very large engineering projects which are characterized by a long time (up to 10 or even 15 years) for designing and building, combined with an even longer planning horizon. The complexity of these plants together with the current stringent requirements regarding the safety implications of a design necessitate the use of dedicated plant and the use of experienced designers. A competent nuclear industry is clearly not one which may be readily set up or redirected and this implies that a degree of long-range planning is necessary to ensure the development and maintenance of individual and collective skills. The timing of station ordering is therefore important in the development of a nuclear industry able to deliver products with due regard to the manufacturing benefits of replication. One of the principal criteria ought to be to ensure that the nation`s manufacturing facilities are evenly loaded over a reasonable period of time in order to ensure the most economic production. The erratic rates of ordering of power plant in the 1960s and 1970s are widely recognized to have caused considerable difficulties to the indigenous power plant industry. These are exemplified by Figure 7.2. which shows the fluctuations in both domestic and export ordering rates for the turbo-generator industry (comprising GEC and NEI) over the past twenty years.

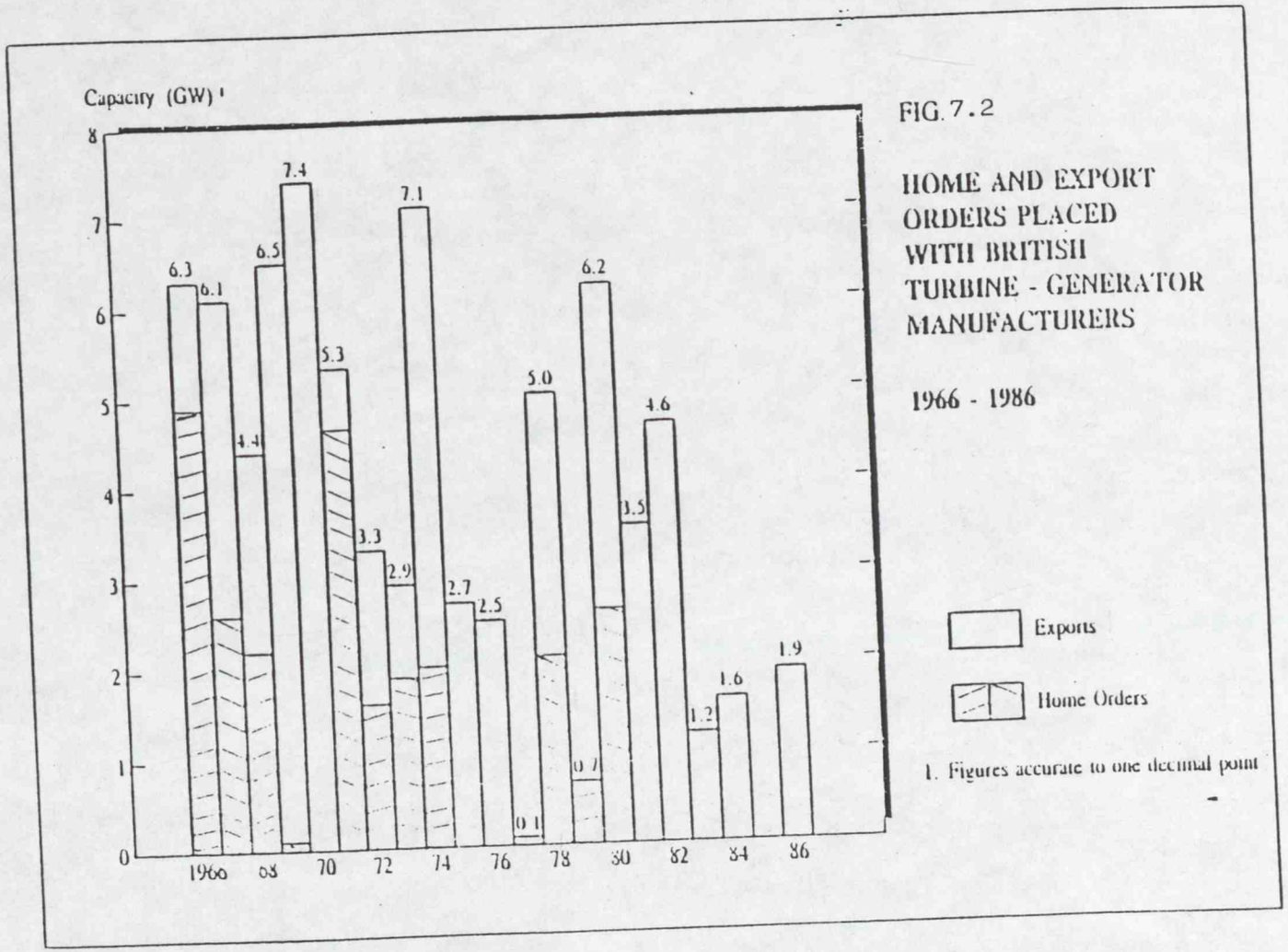

FIG. 7.2

HOME AND EXPORT ORDERS PLACED WITH BRITISH TURBINE - GENERATOR MANUFACTURERS

1966 - 1986

1. Figures accurate to one decimal point

7.11. In 1976 the Central Policy Review Staff (CPRS) recognized the difficulties caused by the lack of a steady ordering rate (Ref 7.2). It is worth quoting one of their conclusions here:

> "The absolutely essential condition for maintaining a viable power plant industry in this country in the long term is a firm, contractual commitment, ... by the Government and the CEGB to a steady ordering programme over at least a 10-year period. Without this commitment the industry will not be in a position to make the investments required to make it viable, let alone internationally competitive".

7.12. The CPRS comments were made at a time when the power plant industry was in a very depressed state due to a long period without receiving orders in the home market and we consider the sentiments to be equally applicable in the current environment. We suggest that it should be possible to devise a flexible ordering procedure involving commitments to the forward intention, to which later adjustments could be made in reasonable increments and with due warning.

7.13. The purchasing policies of the CEGB and SSEB are currently bound by conventions laid down by Government which state that commercial influence should be used, as a matter of enlightened self-interest, to help improve the competitiveness of suppliers. These procedures involve both formal and informal contacts between utilities and suppliers and we consider that it would be beneficial if these could develop into an even closer dialogue in order to identify mutual interests and requirements. Industrial needs and capabilities could then be allied more closely with a commitment to a long-term power plant planning scenario which could also incorporate technological developments jointly identified by the utilities and the manufacturers. It may be argued that it is difficult to plan ahead in this manner since long-range electricity demand forecasts have rarely been accurate. It has also been suggested that plant ordering rates and the optimum coal/nuclear generating mix are matters for the utilities alone and that equipment suppliers ought to be able to make investments on the basis of their individual commercial judgements. We consider however that such arguments ignore the national importance of the power generation sector of the economy and recommend the development of a co-ordinated strategy for power plant development as an important objective for

the utilities and industry. The primary advantage of such a strategy would be to provide the framework to increase the competitiveness of UK manufacturing industry.There would also be potential for increasing the UK content of power plant through identification of strategically important sub-contractors.

CHAPTER 8... PROJECT MANAGEMENT

Background-The Evolution of NNC

8.1. Over the last few decades there has been little stability in the arrangements employed for designing and constructing nuclear plant. This is clearly shown in Figure 8.1 which illustrates the process of consolidation of the remnants of the five consortia responsible for the original Magnox programme and the three for the first phase of AGRs into NNC. This lack of stability, combined with fluctuations in location of the responsibility and accountability for the implementation of technological change, has considerably impaired the record of the UK nuclear industry.

8.2. We consider it fundamental to the success of any nuclear programme that there exists a robust policy framework within which the relevant industries can develop and retain the necessary skills and technologies. We set out in this Chapter some of the elements of that framework which must be addressed in order to improve the national benefit of a nuclear programme, in particular the requirement for a workable market structure and the establishment of clearer lines of management accountability and responsibility. Other factors, such as the undoubted need for quicker planning approval, may be important but are peripheral to our central theme.

8.3. Inadequacies in the organizational arrangements for the UK nuclear power programme were evident in the first phase of AGR construction. It started with three consortia, the Nuclear Power Group (TNPG), the British Nuclear Design and Construction Ltd (BNDC) and the Atomic Power Construction Ltd (APC), each building reactors to slightly different designs and specifications. This resulted in a large bill being paid by the electricity consumer and a number of what were in effect prototype stations, none of which has yet reached its design output levels. In 1973 NNC together with its operating arm, the National Power Company (NPC), were created specifically to provide the required stability in project management by consolidation of the existing AGR construction organisations.

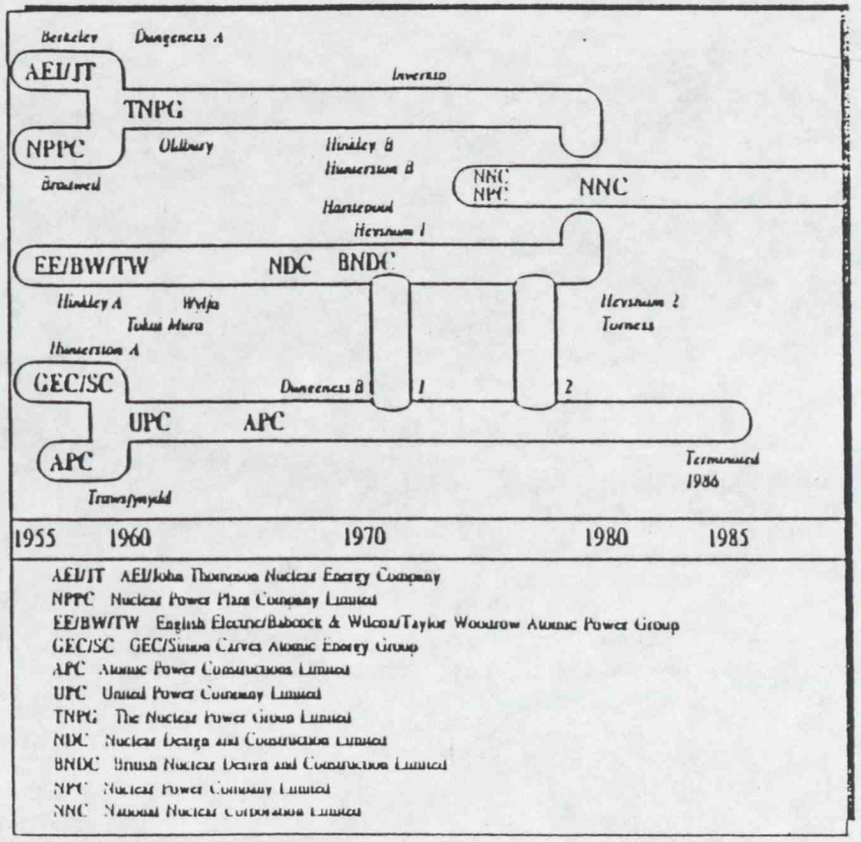

FIG. 8.1

EVOLUTION OF UK NUCLEAR POWER STATION CONSTRUCTION CONSORTIA

1. Agreement to manage APC terminated 1976
2. Agency agreement to manage Dungeness B Nuclear Island.

8.4. The concept was for this company to take eventual responsibility for the design and construction (D&C) of all future nuclear power stations. The intention was that financial and managerial strength would be provided by GEC, who held 50% of the shares. However, disagreements over reactor choice and an absence of orders were major factors contributing to the lack of success of these arrangements. The two-tier NNC/NPC has since been rationalized to a single tier structure together with a reduction in the GEC shareholding and the removal of their supervisory management function.

8.5. NNC currently has a shareholding of 35% Government (through the UKAEA), 30% GEC and the remaining 35% British Nuclear Associates (BNA). The last of these is a "holding company" owned by a group of ex-shareholders of NNC`s predecessors TNPG and BNDC, comprising FKI Babcock plc, Sir Robert McAlpine & Sons Ltd, NEI plc, Taylor Woodrow Construction plc, Dickinson Robinson Group UK Ltd, Whessoe plc and Davy McKee Nuclear. NNC have recently built the nuclear islands for Heysham II and Torness, with good performance in respect of time and cost.

Project management procedures

8.6. There are two principal methods which are generally recognized for ensuring an adequate project management structure. First, an independent engineering company can be employed to act on behalf of the client (the utility) to manage the whole operation, usually on the basis of a fixed fee and reimbursable expenses. Such an architect-engineer designs the complete station (including the safety case), procures the NSSS and conventional plant (including the turbo-generators) and is responsible for cabling, piping, control, instrumentation, heating and ventilation as well as supervising the site work. The architect-engineer contracts for the NSSS from a reactor vendor (such as Westinghouse or Framatome) who supplies the design and hardware for the reactor itself, usually also on a fixed price basis. Some utilities can carry out the architect-engineering themselves (the CEGB does this for its conventional plant) and others (such as EdF or TVA) additionally employ their own work forces. The SSEB currently favours the use of external architect-engineers.

8.7. In the second method a D&C organization is controlled by equipment suppliers and the utility contracts with this single firm, usually on a fixed price basis. In this case the engineering company acts on behalf of, and with the agreement of, its suppliers to put the whole construction package together. Companies such as KWU in Germany, who also manufacture reactor NSSSs, carry out architect engineering for nuclear stations on this basis. The shareholding arrangements of NNC would suggest that it should operate in this manner, with a procurement policy controlled by its shareholders.

8.8. Both of these methods are feasible and the decision on which is more appropriate depends on the relative strengths and weaknesses of the utility and of the D&C companies available to it. The original concept for the Magnox and AGR nuclear power stations was that the D&C consortia would take total responsibility for building the stations (method 2). Although this concept appears to have been reasonably satisfactory for the Magnox plant, the arrangement became severely distorted during the first AGR phase with the CEGB becoming more and more involved in the construction process. The reasons for this are complex, but a contributory factor was the inability of the D&C companies to shoulder the full contractual responsibilities for building the stations.

8.9. Attempts to reverse this blurring of responsibilities were made in 1979 when the Secretary of State for Energy declared that NNC was intended to be built up "into a strong and independent design and construction company, fully able to supply nuclear power stations at home and abroad efficiently" (Ref 8.1). This, combined with its shareholding composed of equipment suppliers, implied that it was intended that, at some time in the future, NNC would be capable of taking total responsibility for the design and construction of a power station, with an arms-length relationship with the CEGB. It was recognized that this evolution would take time and that it would be necessary for NNC to concentrate initially upon supplying nuclear islands. The intended formation of PPP, 50% owned by each of NNC and Westinghouse, would be a step along this route. PPP would hold the sub-licence for the complete Westinghouse PWR system and would, for Sizewell, supply all the nuclear auxiliary systems as well as project-manage, erect and set to work all the nuclear plant. Future PWR orders could be dealt with by the joint company directly, with the prospect

that it could grow to supply a complete NSSS, possibly with some manufacturing capability of its own. This would be especially worthwhile if it were decided to buy out Westinghouse`s interests in PPP.

8.10. However laudable these intentions,they have not been realized in practice.The low capitalization of NNC and the wish of the SSEB and CEGB for an open procurement policy have been contributory factors in preventing the company from accepting liability for major contracts typical in modern power station construction. In 1979 the CEGB and SSEB placed the major contracts for Heysham II and Torness directly with equipment suppliers in order to provide the necessary financial protection, NNC acting only in the role of the utility`s agent. Similarly, NNC`s shareholders were not prepared to accept firm price contracts for Sizewell `B' because the provision of performance guarantees would have entailed too great a commercial risk.

8.11. The CEGB has reduced its own financial exposure for Sizewell `B' by contracting the primary circuit, which comprises some 10% of the total station cost, to Westinghouse who were prepared to give the necessary performance guarantees. The expectation is that, for future PWRs, contracting for the NSSS through PPP will retain Westinghouse experience and will ensure that the financial and technological risks are not all borne by the CEGB.

8.12. NNC regarded the arrangements for Heysham II and Torness as adequate and would have preferred a similar mechanism for the Sizewell `B' project, although it is clear that the CEGB were not similarly content. In 1981 the Monopolies and Mergers Commission (MMC), in its report on the CEGB, advocated certain changes in order to provide a more unified control over the project and to enable a more realistic assessment to be made of the financial risks involved (Ref 8.2). Further modifications were made during the progress of the Layfield Inquiry after Sir Alastair Frame had criticized the project management procedures then proposed for Sizewell `B' (Ref 8.3).

8.13. The Sizewell project is controlled by a Project Management Board (PMB) which reports directly to the CEGB Board. It is responsible for settling policy for project management consistent with CEGB strategic objectives and is chaired by a CEGB Board member, although with Directors drawn from both NNC and CEGB. Executive responsibilities are exercised by a Project Management Team (PMT) which is accountable to the PMB. The procedures currently being used for the project incorporate the primary principle that the responsibilities and accountabilities falling on the CEGB are such that it should undertake the leadership of the project itself, although it is evident that the arrangements do not correspond to either of the generally accepted methods outlined above. For the long term more appropriate procedures with sufficient delineation of design authority should be introduced.

8.14. The PMT currently operates in a fashion which is not ideal for the long-term since, although reporting to the CEGB, it is located in the NNC headquarters at Knutsford and employs approximately equal numbers of NNC and CEGB staff (with some of the latter being transported daily from their base at Barnwood, Gloucestershire). This is hardly the most effective manner in which to use highly skilled personnel. In order to allow the NNC to innovate and develop the company as an independent entity, these short-term arrangements regarding the secondment of NNC`s skilled resources to the CEGB via PMT should not be maintained for the remainder of the projected PWR tranche.

Project management- Possible Solutions

8.15. The CEGB`s Generation Development and Construction Division (GDCD) at Barnwood has a significant design and construction function in both nuclear and conventional generation. It performs the whole of the architect engineering for fossil and hydro stations and undertakes a substantial amount of the Sizewell project with a large body of skilled personnel allocated to the physically separate PMT. NNC`s skill base is considerably narrower although it is highly specialized in NSSS technology for AGR, PWR and fast reactors. ( It was, however, chosen to engineer the Inverkip oil-fired station by the SSEB since this latter organization has no equivalent of the CEGB`s GDCD.) We suggest that consideration should be given to concentrating the relevant resources and management responsibilities in one organization so that the design, procurement

and construction of future civil nuclear power stations can be carried out to time and cost. The formation of such an organization from an amalgam of parts of NNC and GDCD would also enable the formalization of the arrangements for manpower distribution between the CEGB and NNC described in paragraph 8.13. although the procedures for merging these resources depend on a large number of factors, not the least being the Government`s resolve to privatize the ESI.

8.16. The arrangements for the design and construction of civil nuclear power stations, and especially the CEGB/NNC interface, have been considered to be of great importance. We recognize, however, that in the design and construction of PWRs for submarines, there is a large amount of relevant technology (for example in reactor physics, plant dynamics, thermal-hydraulics, materials behaviour and stress analysis) which is either common or similar to both systems. Expertise gained in the submarine PWRs will be applied to the Sizewell `B' project in a contract (worth £5-10m) for inspection of the RPV. We also understand that arrangements are currently being made which will encourage technical exchanges between the company concerned, Rolls Royce and Associates, and the CEGB, and we welcome this development. Nevertheless, it appears logical that, in an industrial sector which is highly demanding in terms of both technological and skilled resource requirements, there is a case for establishing a D&C company which is able to draw on all the nation's resources and avoid duplication of effort.

8.17. The CEGB has experience in both nuclear and non-nuclear projects and it might wish to take greater control of the management of its own construction projects. If it is privatized as a monolithic organization, it would be possible for its successor to group together all the expertise for designing and constructing power stations becoming its own architect-engineer, for nuclear as well as non-nuclear plant. It would possess the intrinsic strength, technological expertise and administrative infrastructure necessary to maintain close management control over the research, design and construction of new plant in addition to the repair and upgrading of existing stations. The architect-engineering activity would in that case need to be a wholly owned subsidiary of the utility, with representation on the Board from experienced project managers. It is, however, doubtful whether such an organization would possess the incentive to contract for work either from other UK utilities or from foreign customers. Past experience has also shown that when the customer is totally responsible for design, there is a tendency towards over-engineering and a loss of the important advantages of replication which the PWR should offer.

8.18. It is also necessary to examine the possibility of all the relevant design, construction and possibly research expertise in the UK residing in a company in the private sector separate from the utilities. We suggest, however, that, if privatization results in a single generating utility within England and Wales and which retains considerable technological and engineering expertise, then such a solution would be unlikely to succeed. The recent relationship between the CEGB and the NNC is sufficient evidence for such a conclusion. If, however, the Government resolves that the Generating Boards are to be further divided on privatization, then the resulting companies may not wish to control the whole research, design and procurement operation for power stations of any description. Under these circumstances, we consider that it would be necessary for the D&C expertise (both nuclear and conventional) to be located in a private sector company separate from the utilities. Although such an organization would probably be based upon NNC, it is suggested that its viability would be enhanced if it, or a parent, engineering company, possessed a greater spread of interests than simply nuclear power station construction.

8.19. Many factors, principally the capitalization and shareholding distribution, would determine whether such a D&C company would accept financial risks or simply manage the construction process on a management fee basis. In this scenario, it would be necessary for the utilities to retain only sufficient skilled resources to assess the designs submitted to them, and to maintain the balance in commercial negotiations. There may even be possibilities for the involvement of the consulting engineering organizations which have not played a significant role in the power generation industry for many years but which have been active in many of the UK`s other large scale construction projects.

8.20. Although we have outlined above two possible ways to improve the arrangements for nuclear power station construction in the UK, we do not make any specific recommendations regarding the optimum solution since we recognize that such a task would be beyond our remit as well as our resources. We do, however, recommend that when considering the manner of privatization of the ESI the Government also takes full account of the ensuing market structure for the design and construction of power plant. We also recognize that, whilst much restructuring could be effected without recourse to legislation, the privatization of the ESI provides the Government with a splendid opportunity to bring about the radical changes required to establish a flourishing nuclear industry which is internationally competitive in the 1990s and beyond.

8.21. If, nevertheless, it is eventually decided not to privatize the ESI, we recommend that steps still ought to be taken to alter the relationship between NNC and CEGB. As already suggested,these should centre around a unification of the national design and construction skills. Depending on the nature of any changes, there is merit in NNC rearranging its capitalization and shareholding so that its R&D capability and latent manufacturing capacity,including the embryo reactor vendor PPP, may be more effectively utilized.

8.22. We see no reason for the Government to hold a substantial stake in any D&C company and recommend that, even if the electricity generation and distribution organizations are retained in the public sector, the Government`s shareholding in NNC should be released into the private sector. We make no recommendations on the manner of the release or of the future ownership of the shares.

8.23. Whatever the outcome of the Government's considerations regarding ESI privatization, it is profoundly to be hoped that consequential arrangements for the nuclear power component will not in future be dominated by the short-term industrial compromises which have in the past often left managerial authority without a sharp focus.

GLOSSARY

ACARD	-	Advisory Council on Applied Research and Development
ACOST	-	Advisory Council on Science and Technology
AEI/JT	-	Associated Electrical Industries/John Thompson Nuclear Energy
AGR	-	Advanced Gas Cooled Reactor
ALARP	-	As Low As Reasonably Practicable
APC	-	Atomic Power Constructions Ltd
BNA	-	British Nuclear Associates
BNDC	-	British Nuclear Design and Construction Ltd
BNFL	-	British Nuclear Fuels Plc
BPL	-	Babcock Power Ltd
CEGB	-	Central Electricity Generating Board
CPRS	-	Central Policy Review Staff
D&C	-	Design and Construction
DEn	-	Department of Energy
EC	-	European Commission
EE/BW/TW	-	English Electric/Babcock and Wilcox/Taylor Woodrow Atomic Power
EEC	-	European Economic Community
EdF	-	Electricite de France
EPRI	-	Electrical Power Research Institute
ESI	-	Electricity Supply Industry
GDCD	-	Generation Development and Construction Division (of CEGB)
GEC	-	General Electric Company
GEC/SC	-	General Electric Company/Simon Carves Atomic Energy Group
GW	-	Gigawatt
HTR	-	High Temperature Reactor
KWU	-	Kraftwerk Union
MCR	-	Maximum Continuous Rating
MMC	-	Monopolies and Mergers Commission
MW	-	Megawatt
NEI	-	Northern Engineering Industries

NIES	-	Northern Ireland Electricity Service
NII	-	Nuclear Installations Inspectorate
NDC	-	Nuclear Design and Construction Ltd
NNC	-	National Nuclear Corporation Ltd
NPC	-	Nuclear Power Company Ltd
NPPC	-	Nuclear Power Plant Company Ltd
NRC	-	Nuclear Regulatory Commission
NSHB	-	North of Scotland Hydro-Electric Board
NSSS	-	Nuclear Steam Supply System
PFR	-	Prototype Fast Reactor
PMB	-	Project Management Board
PMT	-	Project Management Team
PPP	-	PWR Power Projects
PWR	-	Pressurized Water Reactor
R&D	-	Research and Development
RPV	-	Reactor Pressure Vessel
RR&A	-	Rolls Royce and Associates
SGHWR	-	Steam Generating Heavy Water Reactor
SGOG	-	Steam Generators Owners Group
SSEB	-	South of Scotland Electricity Board
TNPG	-	The Nuclear Power Group Ltd
TRA	-	Thermal Reactor Agreement
TVA	-	Tennessee Valley Authority
UKAEA	-	UK Atomic Energy Authority
UPC	-	United Power Company Ltd

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Chapter 3..The Effect of Sizewell `B' on UK Manufacturing Industry

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3.4. J.Leclerq, "La maintenance des Centrales Nucleares",Rev.Energ.No 371,pp80-87,Feb.1985

3.5. F.Fishwick, "The effects on employment within the United Kingdom of the construction of Sizewell `B` PWR station". Evidence to the Sizewell `B' Public Inquiry.

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3.7. Evidence to the Sizewell `B' Public Inquiry by the Town and Country Planning Association

Chapter 4 ..R&D Resources

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Chapter 5..Safety

5.1. The Report of the Sizewell `B' Public Inquiry ,para 35.8

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8.3 Evidence to the Sizewell `B' Public Inquiry by Sir Alastair Frame

Annex A. *List of main contracts let by CEGB for Sizewell 'B'*

As at August 1987

Plant services	*Contrator*	*Main work*	*Contract value (£m)*
Design and software			
HVAC	Taylor Woodrow	Warrington	£2
NSSS component validation	UKAEA	Warrington	£14
Validation for RPV material and welds	UKAEA	Warrington	£13½
Fuel design	BNFL	Warrington	£7
Ultrasonic weld inspection	Babcock Power Ltd	Glasgow	£6
Ultrasonic forging inspection	Babcock Power Ltd	Glasgow	£1 3
Independent inspection agency	Lloyds	London	£3
Reactor coolant pump test facility	Weir Pumps	Glasgow	£5
Hardware			
ASME III pumps	Weir Pumps	Glasgow	£2½
Main feedwater pumps	Weir Pumps	Glasgow	£4½
Polar and fuel building cranes	Butterley's	Ripley (Derby)	£5
Raw water treatment plant	NEI Kennicott	Wolverhampton	£4½
Reactor building liner plate	Cleveland Bridge	Darlington	£9½

Reactor pressure vessel (RPV) forgings	Framatome	France	£7
Radwaste plant	Davey McKee	Stockton	£31
Turbine house crane	Davy Morris	Loughborough	£2
Pipework and mechanical plant	BPA Joint Venture (Babcock, PED, Aiton)	Glasgow, Derby, Tipton	£100
Turbine generators	GEC	Larne, Stafford, Manchester, Rugby	£38
Primary circuit	Westinghouse	Glasgow, Derby, Norwich	£140
Nuclear steam supply system (NSSS) Auxiliary systems	PWR Power Projects (National Nuclear Corporation – Westinghouse)	Knutsford	£36
Diaphragm wall	Stent Soletanche	Hove	£10

Westinghouse has already placed primary circuit sub-contracts worth some £60m with UK companies.

Annex B. *Experience in the design and manufacture of equipment for PWR nuclear power stations overseas*
(Courtesy of British Nuclear Forum)

	Country	*Power station*	*Undertaking*
Babcock Power	Korea	Ko–Ri	Containment vessel.
	West Germany		Design of Helleo heat exchangers for the Otto Hahn marine nuclear reactor.
Balfour Beatty Engineering Ltd	Chile (completed 1971)		Civil design for a nuclear research reactor of 10MW output. Design included hot cell, reactor hall, control and services buildings.
Balfour Beatty Power Construction	South Korea (completed 1977)	Ko–Ri Unit 1	Design, fabrication and site installation of main busbar connections from generator to main transformer.
	South Korea (completed 1977)	Ko–Ri Unit 2	Design, fabrication and supply only of main busbar connections.
British Electricity International	Australia		PWR feasibility studies.
	Sweden		QA on equipment supply.
	USA		QA on equipment supply.
Cunnington & Cooper Ltd	USA		Design, supply and install contract for modular and transportable PWR radwaste handling system.
Darchem Engineering Ltd	Belgium	Doel Tihange	Special purpose insulation. Special purpose insulation.

Darchem Engineering Ltd (cont'd)	France	Le Blayais Cattenom Chinon Cruas Dampierre Fessenheim Flamanville Gravelines Koeberg Paluel St. Laurent Tricastin	Special purpose insulation
	Germany	Biblis Neckarwestheim Unterweser	Special purpose insulation
	Holland	Borssele	Special purpose insulation
	Iran	Bushehr	Special purpose insulation
	Korea	Ko-Ri	Special purpose insulation
	Sweden	Ringhals	Special purpose insulation
	Switzerland	Goesgen	Special purpose insulation
Electrowatt Engineering Services	Brazil	Angra	System design, analysis and safety assessment
	Finland	Loviisa	Special purpose insulation
	Iran	Bushehr	Special purpose insulation
	Romania	Olt	Special purpose insulation
	South Africa	Koeberg	Special purpose insulation
	Switzerland	Liebstadt	Special purpose insulation
	USA		Special purpose insulation
Foster Wheeler Power Products Ltd	Various		Support systems heat exchangers
GEC Energy Systems Ltd	Belgium	Doel Tihange	ISI proposals Fuel hoist drive system

GEC Energy Systems Ltd (cont'd)	Canada	Coastguard	Icebreaker PWR propulsion plant study
	Egypt	El Daban	Nuclear equipment proposals
	Finland	TVO Loviisa	Fuel storage design studies Nuclear instrumentation studies
	France	Framatome	Nuclear equipment manufacturing studies
	Hungary	Paks I	Refuelling machine design
	Korea	Ko–Ri 1	NSSS installation. Detailed design, supply and installation of complete nuclear balance of plant, including: containment, radwaste, all fluid systems' equipment, heating, ventilating, air-conditioning, new and spent fuel support systems, NSSS special tools.
	Kuwait	Ministry of Energy/Water	Small PWR desalination plant major study proposals.
	Romania	Olt 1	Design of containment vessel and refuelling machines.
	USA	TVA	Conceptual designs for fuel storage.
	Sweden	Ringhals	Balance of plant supply and construction proposals.
GEC Turbine Generators	China	Daya Bay	Turbine generators and associated plant.
	Korea	Ko–Ri 1 Ko–Ri 2 Ko–Ri 5/6	Turbine generators and associated plant.

GEC Turbine Generators (cont'd)	USA	San Onofre	Turbine generators and associated plant.
Hopkinsons	USA	Donald C. Cook	Main steam isolation valves.
		Salem	
		WPPSS	Containment isolation, safety injection, feedwater isolation, balance of plant valves.
	Korea	Ko-Ri	Main steam isolation valves, primary circuit isolation valves.
	Sweden	Ringhals	Main steam isolation valves, safety valves.
	France	Bugey	Main steam isolation valves.
		Fessenheim	
	Belgium	Tihange	Main steam isolation, main feed isolation, safety, balance of plant valves.
		Doel	Main steam isolation, safety valves.
	Spain	Almaraz	Main stream isolation valves.
		Asco	Main feedwater isolation valves.
		Lemoniz	Main stream isolation valves, main feed isolation valves.
	Italy	Trino Vercellese	Main steam isolation valves.
		Latina	Gas isolation valves.
		Cirene	Balance of plant valves.
	Canada	NPD des Joachime	Valves for various circuits (CANDU reactors)
		Douglas Point	
		Gentilly 1	
		Pickering A&B	
		Bruce A&B	

Hopkinsons (cont'd)	India	Rajaathan RAPPS 1 & 2 Madras MAPPS 1 & 2	Valves for various circuits (CANDU reactors).
	Pakistan	Karachi KANNUPP	Valves for various circuits (CANDU reactors).
IMI Titanium Ltd	Holland	Borssele	Titanium condenser tubes.
	Sweden	Ringhals	Titanium condenser tubes.
Lloyds Register Industrial Services	Korea	Ko-Ki	Design, appraisal and inspection.
	Spain	Almaraz Asco Lemoniz Zorita	Design, appraisal and inspection.
	Sweden	Ringhals	Design, appraisal and inspection.
	Switzerland	Beznau	Design, appraisal and inspection.
	USA	Duke North Anna Sequoyah Surry Watts Bar	Design, appraisal and inspection.
National Nuclear Corporation (predecessor: British Nuclear Design and Construction Co Ltd)	Korea	Ko-Ri	Balance of secondary plant
Northern Engineering Industries plc	Belgium	Doel Tihange	Bellows sealed and needle globe valves.
	China	Daya Bay	Concrete volute main circulating water units.

Northern Engineering Industries plc (cont'd)	Finland	Loviisa	Bellows sealed and needle globe valves.
	Italy	ISPRA	Pressure vessels and heat exchangers.
	Korea	Ko–Ki	Steam and feed pipework, emergency generators, pumps for auxiliary circulating water duties. Radiation monitoring systems. two 5.5 MW diesel generator sets.
		Wolsung	
	Spain	Vandellos	Polar and other special cranes and handling equipment.
		Asco	Specical cranes and handling equipment.
		Trillo	
		Almaraz	Emergency generators.
		Jose Cabrera	Bellows sealed and needle globe valves
	Sweden	Ringhals	Steam system components, pumps for auxiliary circulating water duties. Bellows sealed and needle globe valves.
	USA	Various	Emergency generators.
		Various	EPRI corrosion studies.
		South Texas	CONSEP condensate polishing technology (under licence).
Rees Instruments Ltd	Belgium	Various	Nuclear TV inspection equipment.
	France	Various	Nuclear TV surveillance inspection equipment.
	Germany	Various	Nuclear TV surveillance inspection equipment.

Rees Instruments Ltd (cont'd)	Italy	PECII	Nuclear TV surveillance inspection equipment.
	India	BIIAIIA	Nuclear TV surveillance inspection equipment.
	Japan	Various	Nuclear TV surveillance inspection equipment.
	Korea	Various	Nuclear TV surveillance inspection equipment.
	Pakistan	KANUPP	Nuclear TV surveillance inspection equipment.
	USA	Various	Nuclear TV surveillance inspection equipment.
VNE (Nuclear) Ltd	Belgium	Doel Tihange	Burnable poison rod assembly equipment.
	France	Le Bugey Fessenheim	Control rod handling equipment.
	Korea	Ko–Ri	Penetrations.
	Sweden	Ringhals	Burnable poison rod assembly equipment.
Whessoe plc	Korea	Ko–Ri	Design, manufacture and supply pipework.
	USA	San Onofre	Design, manufacture and supply pipework.
Wimpey International	Korea	Ko–Ri	Civil engineering and construction.

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10 DOWNING STREET

LONDON SW1A 2AA

From the Private Secretary

24 March 1988

HINKLEY INQUIRY

Thank you for your letter of 21 March. The Prime Minister was grateful for the further information provided about plans for coming forward regularly with further applications for PWR stations, and has noted the action in hand.

PAUL GRAY

Stephen Haddrill, Esq.,
Department of Energy

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cc BG.

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

01 211 6402

Prime Minister
To note this response to your query. Content?

RRC6
21/3

Paul Gray Esq
Private Secretary to
Prime Minister
10 Downing Street
LONDON
SW1A 2AA

21st March 1988

Dear Paul,

Yes pls

HINKLEY INQUIRY

Thank you for yout letter of 16 March. As I mentioned to you last week we shall be announcing the details of the public inquiry today.

The Prime Minister asked whether other inquiries could be got underway at the same time. As I explained we have not yet received applications from the CEGB for other nuclear stations. The first step in the planning process is for the CEGB to apply to the Secretary of State for consent to construct a new power station. There is then a statutory period in which objectors can make their views known. Only after this can the Secretary of State decide whether to hold a public inquiry and, if so, announce the terms of reference, as we are doing today for Hinkley.

My Secretary of State has discussed this with Lord Marshall and he has plans for coming forward regularly with further applications for PWR stations. He expects to apply for a station at Wyfla in the summer and for another at Sizewell early next year. The Secretary of State shares the Prime Minister's ambition that the nuclear programme should be pushed as fast as possible and we are doing all we can to ensure this. However, each application has to be carefully made: Lord Marshall has emphasised the complexity of this process and the scale of resources the Board would need. He has said that it would therefore be very difficult for the CEGB to proceed faster but the Board is doing all it can.

Yours ever,

Stephen.

S HADDRILL
Principal Private Secretary

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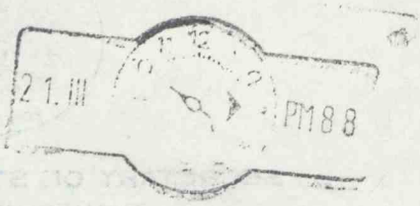
ENERGY: Policy Pt 12



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cc BC

SECRETARY OF STATE FOR THE ENVIRONMENT

2 MARSHAM STREET
LONDON SW1P 3EB
01-212 3434

My ref:

Your ref:

The Rt Hon Cecil Parkinson MP
Secretary of State
Department of Energy
Thames House South
Millbank
LONDON
SW1P 4QJ

NRPM
RRCC
18/3

18 March 1988

Dear Cecil

Flap

Thank you for your letter of 14 March, enclosing the draft of your proposed statement of matters relevant to the Hinkley Point inquiry.

I agree that we need to avoid an inquiry which runs as long as that for Sizewell. Avoiding a repetition of evidence which has already been heard will help in this respect. I am therefore content with the formulation of the "Rule 5 Statement" which you have decided upon.

My officials would of course be happy to give evidence if asked to do so.

I am sending copies of this letter to the Prime Minister, Nigel Lawson, Norman Fowler, John MacGregor, Paul Channon and to Sir Robin Butler.

Yours ever

Nicholas

NICHOLAS RIDLEY

100% RECYCLED PAPER

ENERGY Play pt 12



004/3294

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GCBG



Treasury Chambers, Parliament Street, SW1P 3AG

The Rt Hon Cecil Parkinson MP
Secretary of State for Energy
Department of Energy
Thames House South
Millbank
London
SW1P 4QJ

NBPM
PRCG
17/3

17th March 1988

Dear Secretary of State,

HINKLEY ENQUIRY

Thank you for sending me a copy of your letter of 14 March to Nicholas Ridley. at flap

As my private office indicated to you I am content for you to make your proposed Rule 5 statement.

The statement does not explicitly draw attention to the economics of Hinkley. But we are also agreed - I believe - that, while the CEGB remains in the public sector, the normal investment appraisal process will continue to operate. In particular, before giving investment consent, the Government will want to come to its own view on the economic justification for Hinkley (and, were it decided that Hinkley should not go ahead, it would be open to you to set the future non-fossil fuel obligation at a level reflecting this decision).

I am copying this letter to the Prime Minister, Norman Fowler, John McGregor, Paul Channon, Nicholas Ridley and Sir Robin Butler.

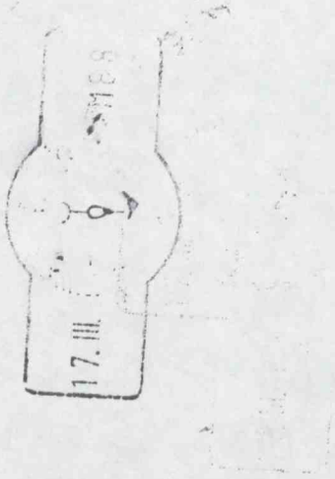
Yours sincerely,

Joe Ewaldsley

pp JOHN MAJOR

(Approved by the Chief Secretary and signed in his absence)

ENERGY: Policy Pt 12



ACOST
Advisory Council on Science and Technology
70 Whitehall, London SW1A 2AS
01-270-0109

file

→ Richard Wilson (Cabinet Office)

S. Haddrill rang me last week to suggest Mr. Parkinson should respond. I said I was very relaxed and invited him to send a note proposing it. RRCG 16/3

Qn 0443

Dr Elliott Finer
Department of Energy
Thames House South
Millbank
London SW1

16 March 1988

Dear Elliott

GOVERNMENT RESPONSE TO THE ACOST REPORT ON THE INDUSTRIAL IMPACT OF SIZEWELL `B'

It is some time since we spoke about this matter (in fact 2 March) when we tentatively discussed the possibility of the response being printed within the report as a letter from the Prime Minister to Sir Francis Tombs. You undertook to discuss this further in the Department and I undertook to consult Richard Wilson.

His initial response was against the idea since this might put the Prime Minister into a position of having to answer questions which properly fell to your Secretary of State. But he was ready to discuss it further if you also approached him. He thought a suitable alternative would be to issue the response to the Press on the day the report is published and/or provide a written answer to an inspired PQ. The normal practice with ACARD reports was for the response to be published by the lead Department some time after the report itself was published. I enclose a copy of that of Medical Equipment as an example.

We have established from HMSO that the report could be ready for publication around 5-11 April and Sir Francis Tombs is anxious to avoid any further delay. I am therefore writing to confirm that the Hinckly Point `C' inquiry will have been announced by then and also to ask how your preparation of the response and discussions on handling the response are proceeding.

I would be grateful for an early reply. I am copying this letter to Richard Wilson (Cabinet Office) and Paul Gray (No 10).

Yours sincerely

Cathy

CATHERINE M CUNNINGHAM

Enc

Secretariat
Telephone 01-270 0105
Telex 27582 CABOFF G
Fax 01-270 0074
Prestel 21 999 3466
Gold 81 MPO 005

CONFIDENTIAL

10 DOWNING STREET
LONDON SW1A 2AA

From the Private Secretary

16 March 1988

Dear Stephen,

HINKLEY INQUIRY

The Prime Minister has seen your Secretary of State's letter to the Secretary of State for the Environment of 14 March, and has noted the proposed handling of the Hinkley Inquiry. She wonders whether, in order to avoid unnecessary delays with other new stations, it would be possible to get other proposals and inquiries underway at the same time.

I am copying this letter to Nicholas Wilson (Department of Employment), Shirley Stagg (Ministry of Agriculture, Fisheries and Food), Roy Griffins (Department of Transport), Alex Allan (HM Treasury) and Trevor Woolley (Cabinet Office).

Yours,
Paul.

PAUL GRAY

Stephen Haddrill, Esq.
Department of Energy

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CONFIDENTIAL

CEGB.

Price Minister 2

PREM 15/3

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

The Rt Hon Nicholas Ridley
Secretary of State for Environment
Department of the Environment
2 Marsham Street
LONDON
SW1P 3EB

14th March 1988

Is it not possible to get other proposals and enquiries on the way at the same time. Otherwise we are never going to get enough stations built. MT

Dear Secretary of State,

HINKLEY INQUIRY

As you will know the CEGB have made an application for my consent under section 2 of the Electric Lighting Act 1909 to construct a nuclear power station at Hinkley Point in Somerset and for deemed planning permission for the development under section 40 of the Town and Country Planning Act 1971.

The local planning authorities have objected to the proposal. I am therefore obliged to hold a public inquiry and announced in December my intention to do so. I decided, however, to delay announcement of the details of the inquiry until a few days had elapsed after my announcement of our plans for the electricity supply industry. I therefore intend to make an announcement to Parliament in the form of an arranged written answer as soon as possible.

In that answer I intend to give information on the start of the inquiry: pre-inquiry meetings should be held in May and July (in line with the new procedures), and the main inquiry should start in early October.

Under the inquiry Rules I must also make a statement of matters which appear to me to be likely to be relevant to my consideration of the CEGB's application (a "Rule 5 statement") and I would intend to include details in my Parliamentary announcement. I enclose a copy of a draft of my proposed statement of relevant matters. In formulating this statement I have tried to strike the difficult balance between the legitimate need for the concerns of objectors to be heard and the wish to avoid unnecessary repetition of Sizewell evidence. The formulation I have decided upon is somewhat less wide-ranging than the Sizewell equivalent but should largely meet objectors' concerns and avoid provoking any attempt at judicial challenge on grounds of narrowness. As you know my statement can in any case only act as a guide to the inspector on the scope of the inquiry and at the end of the day it is for him to decide what evidence is relevant and hence to be heard.

CONFIDENTIAL

The development is proving controversial - there have been 10,000 objectors compared to 4,000 at Sizewell - and the inquiry will inevitably take some time. I hope that the terms of my Rule 5 statement and the improvements in the new inquiry Rules will, however, lead to an inquiry which, while remaining fair and thorough, will be conducted in a timely and efficient fashion - and will in particular be shorter than Sizewell.

In respect of waste management and radioactive discharges you will see (indent (3) of the draft) that your officials are likely to be asked, as at Sizewell, to give evidence to the inquiry. I understand that they have indicated to my officials their willingness to do so.

I am copying this letter to Norman Fowler, John MacGregor and to Paul Channon, in view of the possible need for witnesses from their departments, and to the Prime Minister, the Chancellor of the Exchequer and Sir Robin Butler.

Yours sincerely,

S. Hastings

pp CECIL PARKINSON

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

DEPARTMENT OF ENERGY
Thames House South, Millbank, LONDON, SW1P 4QJ
Telephone: Direct Line 01-211
Switchboard 01-211 3000

ELECTRIC LIGHTING ACT 1909 (SECTION 2): ELECTRICITY ACT 1957 (SECTION 34): TOWN AND COUNTRY PLANNING ACT 1971 (SECTION 40(1)): APPLICATION BY THE CENTRAL ELECTRICITY GENERATING BOARD FOR CONSENT TO CONSTRUCT A PRESSURISED WATER REACTOR NUCLEAR POWER STATION AT HINKLEY POINT IN THE COUNTY OF SOMERSET

Notice is hereby given in accordance with rule 5 of the Electricity Generating Stations and Overhead Lines (Inquiries Procedure) Rules 1987 that it appears to the Secretary of State on the information so far available to him that the following economic, safety, environmental and planning matters are likely to be relevant to his consideration of the Central Electricity Generating Board's application to construct a pressurised water reactor (PWR) at Hinkley Point:

(1) the applicant's requirement for the power station (particularly in the light of Government policy as set out in the Secretary of State's written Parliamentary answer of 17 December 1987 (OR cols 639-640 (attached));

(2) the safety features of the design, construction and operation of the station, taking into account the conclusions on the safety of the Sizewell B PWR contained in the report of Sir Frank Layfield QC and the views of the Nuclear Installations Inspectorate, as representing the Health and Safety Executive (the licensing authority);

(3) the on-site management of radioactive waste arising from the station and radioactive discharges from the station to the environment in the light of the views of the authorising Departments; and

(4) the implications of the proposed development (including construction, operation and decommissioning) for:

(a) agriculture and fisheries;

(b) the local economy including employment;

(c) water supply and disposal;

(d) transport requirements;

(e) coast protection and sea defences;

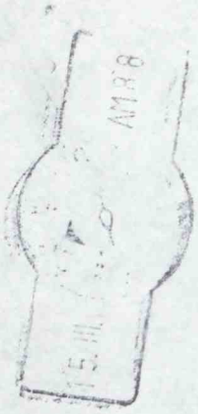
(f) housing and public services generally;

(g) local amenities and in particular areas of special landscape value or nature conservation interest;

(h) emergency arrangements.

March 1988

AN UNDER SECRETARY



CONFIDENTIAL
COMMERCIAL IN CONFIDENCE

CCBS

Sir P Middleton
Mr Anson
Mr Monck
Mr Moore
Mrs Brown
Mr Lyne
Mr Holgate
Mr Call

Treasury Chambers, Parliament Street, SW1P 3AG

The Rt Hon Cecil Parkinson MP
Secretary of State
Department of Energy
Thames House South
Millbank
London
SW1P 4QJ

3 March 1988

Dear Cecil,

NATIONAL NUCLEAR CORPORATION

Thank you for your letter of 26 February.

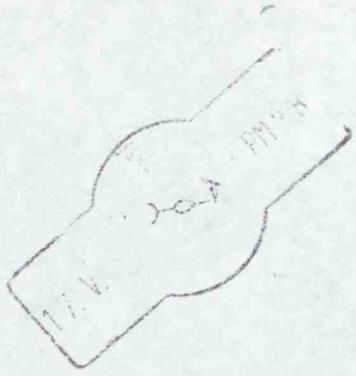
I am content that you should proceed on the basis of Barings' advice and open the negotiation at £17.5 million. This figure is justifiable although, as you note, there is a wide range of consideration that GEC may bring to bear in the negotiation. I agree that our officials should continue to keep in touch; in considering how far to move you will no doubt want to keep in mind the value to Government of dispensing with the contingent liability on the AEA.

I am copying this letter to David Young.

Yours ever,

J.M.

JOHN MAJOR



RLé ECL

bc BG

10 DOWNING STREET
LONDON SW1A 2AA

From the Private Secretary

MR. FAIRCLOUGH
Cabinet Office

ACOST REPORT ON THE INDUSTRIAL IMPACT OF SIZEWELL B

You will have seen the Prime Minister's letter of 29 February to Sir Francis Tombs in which she agreed to publication of this report. I should be grateful if you could now arrange the mechanics. I have mentioned to the Prime Minister the possibility that the Government's response to the report - on which the Department of Energy will be submitting advice - might take the form of a further letter printed with the report.

PAUL GRAY

1 March 1988

10 DOWNING STREET

LONDON SW1A 2AA

THE PRIME MINISTER

29 February 1988

Dear Sir Francis,

Thank you for your letter of 12 February enclosing the modified Report which ACOST has now completed. I am content to accept your recommendation that the Report should be published, and I have asked for the mechanics to be put in hand. I shall write to you again concerning the recommendations in the Report.

Yours sincerely,

Margaret Thatcher

Sir Francis Tombs

SRWBHK

PRIME MINISTER

INDUSTRIAL IMPACT OF SIZEWELL B

You saw last weekend this ACOST Report and agreed that it would have to be published, although the timing would have to be considered.

I now attach advice from the Department of Energy on that aspect. They suggest that publication should be delayed until after the forthcoming announcement on the Hinkley Point 'C' Inquiry. I understand that this is expected to be between 5-8 March. In practice it would not now be possible to publish any sooner than that, given the need to arrange printing, etc. I have asked the Cabinet Office to put this in hand.

The attached letter for your signature says that you will write to Sir Francis Tombs again about the Report's recommendations. Further advice will be coming during the next week from the Department of Energy on the terms of that response. I have agreed with the Cabinet Office that, if you are content, ~~you~~ we might arrange to publish your letter responding to the recommendations at the same time as the Report itself.

Content to sign the attached interim reply and for us to plan the next stages as described above?

RRCG.

(PAUL GRAY)
26 February 1988

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

Paul Gray Esq
Private Secretary to
The Prime Minister
10 Downing Street
LONDON
SW1A 2AA

23 February 1988

Dear Paul,

ACOST REPORT: THE INDUSTRIAL IMPACT OF SIZEWELL B

In your letter of 15 February you sought advice on the proposal that this ACOST report be published, and on the terms of the Government's reponse.

My Secretary of State does not believe that publication of the report is going to be of much benefit to the Government's nuclear policy. The report suggests there are inadequacies in current arrangements for the design and construction of nuclear power stations, including the project management arrangements for Sizewell B. It also criticises aspects of the safety regime including the way it may affect the economics of building new power stations. He does not find benefit in the way the report recommends linking action on these issues to ESI privatisation. Overall, he feels that parts of the report would be welcomed by anyone wishing to support claims that new nuclear power stations will not be built to time and cost.

My Secretary of State does however recognise that much of the report is for the nuclear industry and others to answer, rather than for Government. Those parts that are for Government can be answered robustly: we are working on a draft response, in consultation with other Departments. Its main thrust will be to highlight the positive parts of the report, eg the industrial and employment benefits of the PWR programme; to show how the criticisms of the safety regime are based on incomplete understanding; and to point out that private sector pressures on the ESI will result in effective project management arrangements for future power stations. This response, which should be made at the same time as publication of the report, will be more effective if it can be made in the light of my Secretary of State's forthcoming announcements on ESI privatisation and the

SECRETARY OF STATE FOR ENERGY

Hinkley Point 'C' Inquiry. Taking into account the normal pressures to publish, my Secretary of State would therefore not oppose publication, but suggests this should not take place until after these announcements have been made.

I am copying this letter to the recipients of yours.

Yours sincerely,

Stuart Brand

STUART BRAND
Private Secretary

ENERGY : Policy Pt 12

009/4215

CONFIDENTIAL

RA

Treasury Chambers, Parliament Street, SW1P 3AG

Paul Gray Esq
Private Secretary
10 Downing Street
London
SW1

22 February 1988

Dear Paul,

ACOST REPORT ON THE INDUSTRIAL IMPACT OF SIZEWELL B

The Chief Secretary has asked me to say that he would have no difficulty in principle with the publication of the ACOST report about which you wrote to Stephen Haddrill on 15 February. He would be content to be guided by Mr Parkinson's advice on the timing of publication.

I am copying this letter to the Private Secretaries to the other members of E(ST), Nicholas Wilson (Department of Employment), Trevor Woolley (Cabinet Office) and John Fairclough (Cabinet Office.)

Yours

Jill

JILL RUTTER
Private Secretary

ENERGY: Policy PTR

PRIME MINISTER

ACOST REPORT: THE INDUSTRIAL IMPACT ON SIZEWELL B

Sir Francis Tombs wrote to you on 12 February enclosing the redrafted report of this study by ACOST. You may also wish to see John Fairclough's note of the same date.

I have asked for advice from the Department of Energy on whether you should agree to the report being published and on the terms of the Government response to it. This advice has not yet been agreed by Mr. Parkinson, but you may like to glance at the report over the weekend.

I understand that, if he accepts the advice put to him, Mr. Parkinson will recommend you to allow publication of the report. He will say that the document is in some respects less than helpful to the Government, but these difficulties are not now such as to justify refusing publication. He will however suggest that it would be best to delay publication until after decisions on electricity privatisation, and the terms of reference for the inquiry into Hinkley C, have been announced. The latter is expected early next month. He may also propose that the Government's response to the report, of which a draft will be put to you soon, should be published at the same time.

It will have to be published

Things is for discussion.

RRC6.

PAUL GRAY
19 February 1988

EL3CNH

CONFIDENTIAL

JD

10 DOWNING STREET

LONDON SW1A 2AA

From the Private Secretary

15 February, 1988.

Dear Stephen,

ACOST REPORT: THE INDUSTRIAL IMPACT OF SIZEWELL 'B'

Sir Francis Tombs wrote to the Prime Minister on 12 February enclosing a revised copy of the ACOST Report, on the industrial impact of Sizewell 'B', and requesting that it be published.

I should be most grateful if your Secretary of State could prepare advice for the Prime Minister on the proposal for publication, and on the terms of the Government's response to the Report. It would be helpful for this advice to be available by Friday, 19 February. The Report raises issues that are also of particular interest to the Department of Trade and Industry, and I am therefore sending a copy of this letter to Alison Brimelow in the DTI.

I am also copying this letter for information to the Private Secretaries to the other members of E(ST), Nicholas Wilson (Department of Employment), Trevor Woolley (Cabinet Office) and John Fairclough (Cabinet Office).

Yours,

Paul

Paul Gray

Stephen Haddrill, Esq.,
Department of Energy.

CONFIDENTIAL

ACOST
Advisory Council on Science and Technology
70 Whitehall, London SW1A 2AS
01-270-0109

CONFIDENTIAL

Qn 0382

The Rt Hon Margaret Thatcher MP
The Prime Minister
10 Downing Street
London SW1

12 February 1988

Dear Prime Minister,

THE INDUSTRIAL IMPACT OF SIZEWELL `B'

I wrote on 10 November, enclosing the report of a study initiated by ACARD and completed by ACOST. This study examines the likely industrial impact of the UK's future nuclear reactor programme, following the approval of the construction of the pressurized water reactor at Sizewell.

Since then, we have received helpful advice from the Treasury Solicitor and, because we hope that the report will be published, we have modified the report in certain respects. These changes were agreed by ACOST at its meeting on 5 February on the recommendations of myself and the Chairman of the group which undertook the study, Lord Flowers. I now enclose a copy of the revised report and request that it be published.

There are four important points which I would like to emphasize. The first two are set out in my letter of 10 November.

First, the report is clear in its central finding that the choice of a foreign, rather than an indigenous, reactor type is likely to have only a marginal overall impact upon UK industry if a determined programme of capital investment in supply industries in the UK takes place and is effective in offsetting the combined effect of European trade liberalisation and the substantial manufacturing over-capacity for PWR components in European countries. Unless this is so, imports of PWR components are likely to be substantial.

Secondly, we are concerned about the adequacy and efficiency of the institutional arrangements regarding the construction of nuclear power stations. The principal concern relates to the relationship between the Central Electricity Generating Board and the National Nuclear Corporation which was formed initially under difficult circumstances and has never evolved to the satisfaction of either partner. A radical change is necessary to re-arrange the relationship and your Government will shortly possess an opportunity to effect such an alteration during the formulation of the legislation to privatize the Electricity Supply Industry.

Secretariat:
Telephone 01-270 0105
Telex 27582 CABOFF G
Fax 01-270 0074
Prestel 21 999 3466
Gold 81 MPO 005

The third point relates to the inadequacy of the present planning enquiry system to assess the effects on the UK industrial base of major capital ventures of this type. Alternative mechanisms may be required to ensure that this issue is always addressed in order to avoid the danger of lengthening the enquiry process.

The final point concerns the need for adequate resources to be available to the Nuclear Installations Inspectorate for them to be able to give proper considerations to the human factors element in safety.

I hope these particular points can be borne in mind in preparing the Government's response. Although the report is of most relevance to the Secretary of State for Energy, some conclusions will also be of interest to the Department of Trade and Industry, particularly with regard to the future competitiveness of the UK nuclear component industry.

Yours sincerely

Francis Tombs

SIR FRANCIS TOMBS

ENEROS : poligpt 12



CONFIDENTIAL

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2 pp's

MR GRAY

10 Downing Street

12 February 1988

ACOST REPORT: THE INDUSTRIAL IMPACT OF SIZEWELL B

Further to my minutes of 25 and 27 January, and yours of 1 February, the revised report was endorsed by ACOST at its meeting on 5 February. This is to let you know that Sir Francis Tombs will shortly write to the Prime Minister requesting that the report should be published in its new form. He is likely to draw attention again to the main features of the report, as he did in his earlier letter of 10 November, and to a few new points which he feels are not made so explicitly in the revised version.

2. To help the Prime Minister decide on publication, you will want to seek advice from Department of Energy Ministers, and possibly Trade and Industry Ministers as well, in view of the references in the report to the capability of the UK equipment manufacturers. There may be some continuing reluctance to publish but I would draw attention to three factors which need to be set against this. First, the decision that ACARD were setting up this study was announced publicly. Second, a request from ACARD for its reports to be published has never so far been rejected. These two factors make it extremely likely that the Government's refusal to publish the report would become public knowledge and that this would raise disproportionate speculation about the contents of the report. Finally, the conclusions and recommendations of the report are directed not just at Government but also at industry, the higher education system and others. It would be unfortunate in my view if these wider recommendations were not addressed.

3. The Prime Minister will also wish to decide how the Government's response to this report should be handled. Although the Secretary of State for Energy clearly has the primary responsibility, other Ministers will also have an interest. For these reasons, the Secretary of State for Energy might be asked to agree the response with E(ST) colleagues.

4. I am copying this minute to Sir Robin Butler and Richard Wilson.

JOHN W FAIRCLOUGH
Chief Scientific Adviser

ENERGY : policy pt 12

CONFIDENTIAL

PMB

10 DOWNING STREET
LONDON SW1A 2AA

From the Private Secretary

4 February 1988

Dear Stephen,

THE TOLERABILITY OF RISK FROM NUCLEAR POWER STATIONS: PAPER BY THE HEALTH AND SAFETY EXECUTIVE

Thank you for your letter of 3 February. It would be most helpful if you could keep me in touch with the results of the comments on the discussion document and the development of the HSC's views.

I am copying this letter to the Private Secretaries to the Secretaries of State for Employment, Environment, Health and Social Security, Transport, Scotland and Wales, the Minister of Agriculture, Fisheries and Food and the Chairman of the Health and Safety Commission.

Yours,
Paul

Paul Gray

Stephen Haddrill, Esq.,
Department of Energy.

CONFIDENTIAL

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CONFIDENTIAL

CC PS
(letter only)

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

01 211 6402

Paul Gray Esq
Private Secretary to
The Prime Minister
10 Downing Street
LONDON
SW1A 2AA

3rd February 1988

Dear Paul,

THE TOLERABILITY OF RISK FROM NUCLEAR POWER STATIONS: PAPER BY THE HEALTH AND SAFETY EXECUTIVE

One of the recommendations in Sir Frank Layfield's report on the Sizewell B Public Inquiry was that the HSE should formulate and publish guidance on the tolerable levels of risk to individuals and to the community as a whole from nuclear power stations, in the form of a consultation document. In his decision letter of 12 March 1987, Mr Walker stated that he would establish with all those concerned how this work could best be undertaken with urgency.

In the light of this, officials of this Department held discussions with the HSE and other Departments concerned, to agree the basis on which the document should be prepared, and an outline prepared by the HSE was cleared with Mr Walker. The subsequent drafting of the paper has been done by the HSE in consultation with independent experts and with the National Radiological Protection Board (NRPB).

Officials of this Department have also been involved and the draft paper has also been seen by the Departments of Employment and of the Environment. The views of the main organisations in the nuclear industry have also been taken, informally and in confidence. They seem generally content with the approach adopted in the paper.

The resulting paper is to be published by the HSE tomorrow afternoon 4 February. Publication and the associated press briefing are timed for 3.00 pm.

The paper begins by discussing how people approach risk in day to day life and how important industrial risks such as the nuclear risk are assessed and regulated. It goes on to explain the nature of the risk from ionising radiation, the ways in which risks arise from nuclear installations and how the HSE's Nuclear Installations Inspectorate sets about assuring their control. It suggests what levels of risk might reasonably be regarded as tolerable in comparison with other risks in life, taking into account the whole spectrum of industrial risk.

It concludes that the levels of risk from nuclear power, both through normal operation and through potential accidents, compare reasonably with the levels which arise in everyday life, and in other areas of industry. But there will almost inevitably be some criticisms of the paper from the anti-nuclear lobby. The Executive will say in response that the Commission, an independent tripartite body, will form its own views after it has taken account of all comments (it is allowing about three months for comments to be submitted) and considered the paper fully itself.

The paper is in fact being published as a basis for discussion, not a formal consultative document. In addition to comments from interested organisations and the general public, the Advisory Committee on the Safety of Nuclear Installations (ACSNI) has also been asked by the HSC for its advice. When the HSC has formed its own views it expects to make them public. They expect to do so before the start of the Hinkley 'C' Inquiry.

We shall be careful to avoid any commitment to a Parliamentary Debate on nuclear safety, though there could be pressure for this - Layfield's original recommendation referred to the desirability of Parliamentary opinion being expressed and Mr Walker in his decision letter acknowledged the interest of Parliament.

Please let me know if you have any questions or need any additional briefing.

I am copying this letter to the Private Secretaries of the Secretaries of State for Employment, Environment, Health and Social Security, Transport, Scotland and Wales, and to those of the Minister of Agriculture, Fisheries & Food and the Chairman of the Health and Safety Commission.

Yours ever,

Stephen.

S HADDRILL
Principal Private Secretary

CONFIDENTIAL

fle 5cH

cc BG

10 DOWNING STREET

LONDON SW1A 2AA

From the Private Secretary

MR. FAIRCLOUGH

ACOST REPORT: INDUSTRIAL IMPACT OF SIZEWELL 'B'

Thank you for your two minutes of 25 and 27 January. I note the position reached following your discussions with Department of Energy officials. I think the procedure has to be that ACOST considers its position on 5 February and then Department of Energy Ministers must advise the Prime Minister on how they see the balance of considerations about publication. I see no point in putting the papers to the Prime Minister until we have reached that point.

I am copying this minute to Mr. Haddrill (Department of Energy), Sir Robin Butler, Mr. Wilson and Mr. Monger (Cabinet Office).

RCG.

PAUL GRAY

1 February 1988

CONFIDENTIAL

fr BIF 29/1

CONFIDENTIAL

W0376

MR GRAY

c Sir Robin Butler
Mr Wilson
Mr Monger

27 January 1988

ACOST REPORT: INDUSTRIAL IMPACT OF SIZEWELL `B'

Officials in the Department of Energy have looked at the report as it will go to ACOST on 5 February. They will not advise the Secretary of State to object strongly to publication. Although they consider that publication might not be in the narrow interests of the Department of Energy, because it is inevitably critical to some degree of the status quo and will therfore give support to objectors to nuclear power, they would say that this concern has to be balanced against wider national interests. NII's proposed modifications have been incorporated and so there is no reason to resubmit to them.

2. DEn will not put advice to the Secretary of State until the final report reaches the Prime Minister. Ideally I would have preferred some indication of the Secretary of State's own thinking but to seek that might be premature. I think therefore that we should let matters proceed through ACOST in the way indicated in my note of 25 January.

JOHN W FAIRCLOUGH
Chief Scientific Adviser

NEW ST. ANDREW'S HOUSE
ST. JAMES CENTRE
EDINBURGH EH1 3SX

CONFIDENTIAL

The Rt Hon Cecil Parkinson MP
Secretary of State for Energy
Department of Energy
Thames House South
Millbank
London
SW1P 4QJ

26 January 1988

Dear Cecil,

NATIONAL NUCLEAR CORPORATION (NNC)

Thank you for your letter of 23 December about the approach you have received from Lord Weinstock proposing that GEC should buy the Government's shareholding in the NNC.

Donald Miller has stressed to us on a number of occasions the central importance of the NNC to the SSEB and his concern about the implications for their AGR operations of possible future arrangements. This view is also reflected in the external advice I am receiving on privatisation of the industry. It is certainly important that these arrangements should be clear and secure in the run-up to privatisation and I am glad to note from your letter the commitment on offer from GEC and the present management of NNC on the continuation of AGR support operations - I believe it will be important to have these assurances spelled out in some detail before any disposal proceeds.

I agree that you should speak to Donald Miller and would be glad to know of his reaction and also to be kept informed of the progress of your subsequent consideration of this proposal.

I am copying this to the Prime Minister, Nigel Lawson and David Young.

Yours ever,

MALCOLM RIFKIND

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ENERGY Policy pt 12

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MR GRAY - No. 10

25 January 1988

ACOST REPORT: INDUSTRIAL IMPACT OF SIZEWELL `B'

Following David Norgrove's note of 18 December (copy attached) to Richard Wilson I have had a detailed discussion of the report with Sir Francis Tombs and he, in turn, has discussed it with Lord Flowers. Both accept that before the report could be published some amendments to the text would be necessary to meet the concerns expressed by the Treasury Solicitor and to ensure that there are no factual inaccuracies.

2. Sir Francis and Lord Flowers have therefore agreed a version of the report which effectively incorporates all the modifications suggested by the Treasury Solicitor. It also includes some, but by no means all, of the suggestions from the Department of Energy and the Department of Trade and Industry. It substantially accommodates the difficulties regarding the impact of the report on the Hinckley Point `C' Inquiry and passages which might have been damaging to the commercial interests of UK industry have been deleted or amended.

3. Sir Francis now proposes putting this amended report before ACOST when it next meets on 5 February and, subject to the views there expressed, will resubmit the report to the Prime Minister. The report would not go back to members of the Study Group since their work was completed when they submitted a draft report to ACOST. If a decision to publish is taken they would then receive a copy of the report as a matter of courtesy.

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4. Since the modifications are being made in order to achieve a publishable document it must be expected that ACOST will, through Sir Francis, again request publication if they agree to adopt the modified version. It would be helpful to the conduct of the ACOST meeting to have some indication as to whether Government is likely to agree to publish. I would welcome your own reaction, and that of copy recipients, particularly those in the Department of Energy.

5. Sir Francis and Lord Flowers have made substantial modifications to meet the legitimate concerns of the Treasury Solicitor and Departments. They have, so far, dealt with the matter in a very reasonable way but I am quite sure that they will not be prepared to introduce any further changes and to press them further would be counter-productive.

6. I am still of the opinion, for reasons expressed in my note of 10 November, that the report should be published. Apart from the fact that it would establish a very bad precedent for the first ACOST report not to be published, by publishing the Government would show itself as confident in its own views in being able to deal openly with advice on these difficult issues.

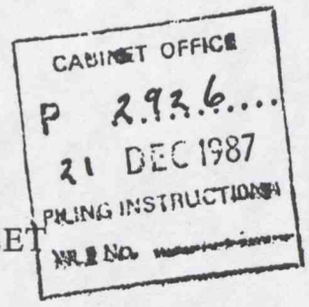
7. I am copying this note to Robin Butler, Richard Wilson and **George Monger** in the Cabinet Office, John Guinness and **Elliot Finer** in the Department of Energy and John Cottrill in the Department of Trade and Industry. Copies of the report are enclosed for those underlined. Copies can be supplied on request for others.

JOHN W FAIRCLOUGH

pp Chief Scientific Adviser

Sir R Armstrong CONFIDENTIAL
cc Mr Monger
Mr Haviclough





10 DOWNING STREET
LONDON SW1A 2AA

From the Private Secretary

18 December 1987

Dear Richard,

ACOST REPORT: INDUSTRIAL IMPACT ON SIZEWELL 'B'

I have shown the Prime Minister your minute to me of 16 December about the ACOST report on the industrial impact of Sizewell 'B'. She is content to proceed in the way you propose.

Yours,

David.

DAVID NORGROVE

R. T. J. Wilson, Esq.,
Cabinet Office

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ADVISORY COUNCIL ON SCIENCE AND TECHNOLOGY

"THE INDUSTRIAL IMPACT OF SIZEWELL`B'"

A REPORT
ON THE INDUSTRIAL IMPACT OF
POST-SIZEWELL NUCLEAR REACTOR POLICY

VERSION PREPARED 22 January 1988

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THE INDUSTRIAL IMPACT OF SIZEWELL `B'

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Annex A. List of Main Contracts Let by CEGB for Sizewell `B'
Annex B. Experience in the Design and Manufacture of Equipment for PWR Nuclear Power Stations Overseas

CHAPTER 1...EXECUTIVE SUMMARY AND RECOMMENDATIONS

1.1. Following the publication of the report of the Sizewell `B' Public Inquiry, chaired by Sir Frank Layfield, and the subsequent Government decision to authorize construction of a pressurized water reactor (PWR), the Advisory Council on Applied Research and Development (ACARD), (which subsequently was reconstituted as the Advisory Council on Science and Technology (ACOST)) set up a Working Group to examine the industrial implications of the future UK nuclear programme.

1.2. The primary objective of the Working group was the quantification of the effects of the introduction of a non-UK design of reactor upon employment, the availability of skilled resources, and on imports and exports. Its underlying rationale was to complement the Public Inquiry report, using its conclusions as the starting point. Government support for nuclear power generation has been assumed throughout this study, in addition to its resolve to privatize the Electricity Supply Industry (ESI).

1.3. A nuclear programme requires a high level of investment in manufacturing infrastructure and in order to develop and maintain the long-term efficiency of the nuclear industry we recommend that clear priority is given to the ordering of plant at a rate which allows for the development and retention of the necessary skills and technologies, allied with an even loading of manufacturers` facilities. The full economic benefits of a programme will not be realized without strictly controlling the evolution of the design, approaching complete replication.

1.4. In these circumstances it is essential to concentrate for many years on the provision of only one thermal reactor design. We agree with the Central Electricity Generating Board (CEGB) that efforts should be directed towards the construction of the PWR now that the decision to proceed with Sizewell `B' has been taken. Although sufficient resources must be allocated to achieving the safe and efficient operation of the Advanced Gas Cooled Reactors (AGR), we consider that there is no point in spending extra money in maintaining the option for the construction of further AGRs.

1.5. The decision to build an internationally accepted design of reactor has potentially exposed British manufacturing industry to an increased degree of foreign competition, a position which could become even more evident in the future if the European Community (EC) removes some of the energy sector trade restrictions which exist between EC countries. UK industry is expected to obtain contracts worth 93% of the value of the hardware for Sizewell 'B', of which most, but not all, will probably be spent in the UK. It should be able to compete for an even higher fraction for future PWRs if steps are taken by manufacturing industry to identify those power station components which are currently imported, with a view to providing the necessary investment in facilities and technologies to enable domestic production.

1.6. The choice of a PWR will not have a large impact upon total UK employment. The fact that the UK is able to manufacture PWR components should increase the long-term opportunities for those companies exporting PWR equipment and services, particularly those items which require technical endorsement within a PWR environment. The development and subsequent maintenance of a competitive domestic industry producing PWR components should also prove beneficial in the export market for the upgrading and repair of existing overseas stations. Success in the export market will depend upon the ability of UK companies to be internationally competitive and upon the maintenance of a design within the UK which is compatible with the mainstream of PWR development.

1.7. The introduction of a reactor type new to civil nuclear power in the UK has so far not necessitated substantial increases in skilled manpower resources dedicated to research and development (R&D), or design, or for licensing purposes. This is, in part, due to the availability of a large body of data from overseas PWRs and some redistribution of manpower away from gas-cooled nuclear R&D. The core of nuclear expertise originally developed for gas-cooled reactors has, so far, required only limited expansion to accommodate the different technology unique to the PWR design. However, if there is not to be a shortage of skilled engineering manpower to carry out the future nuclear programme, there will need to be special training given to overcome problems arising from the low level of construction over the last decade, combined with an adverse balance between recruitment and retirement.

1.8. The Government has a responsibility to underpin long term ventures in power generation. That has included the development of the fast reactor, the basic technical and engineering feasibility of which has been demonstrated. The investment of public funds in design and R&D for this system has been considerable.We also note, with approval, that funding of the fast reactor project is increasingly being transferred away from Government to the CEGB in recognition of the fact that this technology is approaching commercialization, and recommend that this process should be accelerated. The question of the possible transfer of responsibility for the fast reactor from UKAEA to the utilities is a matter which requires addressing simultaneously with the privatization of the ESI.

1.9. We believe that the Nuclear Installation Inspectorate (NII) should be able to maintain a sufficient cadre of engineers and other relevant skills to carry out its important functions without imposing delay at any stage in the construction of a nuclear power station. We consider that,in addition, it would be advantageous for the NII to increase the account it takes of factors such as the human element (prominent since Chernobyl) and to take a full part in discussions on the development of international standards of safety assessment. It is also important that the Health and Safety Executive (HSE) and the NII should pursue the recommendations in the report of the Sizewell `B' Public Inquiry towards an increased economic discipline on assessment criteria. In addition, we recommend that in the future the NII provides utilities with a clearer knowledge of the requirements under which a design will be licensed, and that opportunities be taken to move towards a more definitive statement of design requirements; that is to a more prescriptive mode of the ALARP (As Low As Reasonably Practicable) principle.

1.10. Since the Working Group was set up, the Government has announced its resolve to privatize the ESI. Whilst no specific proposals for this have been published, we have taken some aspects of this development into account. We consider that the Government`s commitment to nuclear power cannot be fulfilled unless it ensures that after privatization utilities which possess nuclear plant have the technological resources, capitalization and tariff structures necessary to retain such capacity as a safe and economically attractive option and that account is taken of the future market structure of the

manufacturing and engineering industry serving the nuclear programme.

1.11. The project management arrangements instituted between the CEGB and the National Nuclear Corporation (NNC) for Sizewell`B' are not ideal for the long term. We recommend that, in the arrangements for privatization of the Electricity Supply Industry (ESI), consideration should be given to concentrating the relevant resources and management responsibilities in one organisation so that the design, procurement and construction of future civil power stations can be carried out to time and cost. The Government should regard the privatization of the ESI as a splendid opportunity to implement such a change in the industry`s market structure.

1.12. The detailed arrangements for such a design and construction (D&C) organization depend greatly on the manner of privatization of the ESI and this is a subject beyond our terms of reference. It is clear, however, that if a major utility is created possessing a strong financial, managerial and technological capability, a choice exists between the options of grouping the D&C expertise in a subsidiary of the utility, or embodying that expertise in an independent entity which would be fully capable of designing and arranging the procurement of nuclear stations and which would operate on a commercial client-customer basis. The latter option would be more suitable if the ESI in England and Wales was divided into small units. We make no specific recommendations regarding the choice between these options but in any case see no reason for the Government to hold a substantial stake in any design and construction company. We recommend that, even if the electricity generation and distribution organizations are retained in the public sector, the Government`s shareholding in NNC should be released into the private sector. We make no recommendations on the manner of the release or the future ownership of the shares.

CHAPTER 2...FOREWORD

2.1. In January 1981 an application was made by the CEGB for the consent of the Secretary of State for Energy, under section 2 of the Electric Lighting Act (1909), to the construction of a PWR at Sizewell. Sir Frank Layfield QC was appointed as Inspector to hold a public inquiry into this application, with the following points being considered by the Secretary of State to be relevant:

a. the CEGB`s requirement for the power station in terms of the need for secure and economic electricity supply and having due regard to the Government`s long-term energy policy;
b. the safety features relevant to the design, construction and operation of the station and ,in particular, the views of the Nuclear Installations Inspectorate as the licensing authority;
c. the arrangements for waste management in the light of the views of the authorizing Departments;
d. the implications of the proposed development (including both construction and operation) for;
    i. agriculture and fisheries;
    ii. local employment;
    iii. water supply and disposal;
    iv. transport requirements
    v. coast protection;
    vi. housing and public services generally;
    vii. local amenities, and in particular, areas of special landscape value or nature conservation areas.

2.2. The report was delivered to Government in late 1986 and the decision to authorize the construction of a PWR was made in early 1987. The report (Ref 2.1), hereafter described as the Layfield Report, gave unequivocal support to the conclusion that there was a national interest in building the PWR and, with some minor qualifications, supported the CEGB`s overall case. In particular, the Inspector confirmed that building the proposed PWR was likely to be the cheapest way to maintain an economic and continuous supply of electricity.

2.3. The selection of the PWR is regarded as a major step for UK industry and ACARD identified the industrial impact of the resulting nuclear reactor policy as being of particular interest. Although the significance and authority of the Layfield report was noted, it was considered that the PWR decision could have effects on UK industry as well as on the shape of the future UK energy scene and ACARD therefore set up a Working Group to provide advice about these implications. Its composition was as follows:-

Lord Flowers (Chairman)	- Vice Chancellor, University of London,
Mr C Allday	- British Nuclear Fuels (retired Chairman and Chief Executive),
Mr J Collier	- Chairman, United Kingdom Atomic Energy Authority,
Mr J B Cook	- Engineering Manager, Shell UK Exploration and Production,
Sir Sam Edwards	- University of Cambridge Chief Scientific Adviser to the Department of Energy,
Prof I Fells	- Department of Chemical and Process Engineering University of Newcastle upon Tyne,
*Mr E A B Hammond	- General Secretary, Electrical, Electronic, Telecommunication and Plumbing Union,
Prof D C Leslie	- School of Engineering, Queen Mary College, University of London,
Mr M V Posner	- Secretary General, European Science Foundation,
*Dr A Rudge	- Research Director, British Telecom,
Dr N A Burdett	- Secretary.
Mr J Cottrill	- Assessor, Department of Trade and Industry,
and Mr J Guinness	- Assessor, Department of Energy

assisted the Working Group in the course of the study but did not take part in the drafting of the report's conclusions and recommendations.

* ACARD/ACOST Member

The work of the Working Group continued after ACOST had subsumed ACARD in August 1987.

2.4. The terms of reference for the study were:

"To assess the impact of future UK reactor policy, in the light of the Government`s decision to construct a pressurized water reactor at Sizewell, on the requirements for industrial R&D and on the resultant technological and commercial opportunities, taking particular account of:

(i) skilled manpower requirements for R&D within power station construction, operation, regulatory organizations and the fuel services;

(ii) the development of advanced manufacturing methods and the export potential for systems or components;

(iii) the opportunity costs of expending resources on development programmes for more than one reactor type."

2.5. This study was not required to examine the wider questions associated with the acceptability of nuclear power and has not attempted to do so. We have started our analysis on the premise that it is Government policy to maintain a nuclear power programme and that the PWR is the currently preferred option of the major electricity generating utility in the UK for its next construction phase.The underlying rationale has been to complement the Layfield Report, using its conclusions as the starting point for our analysis.

2.6. We consider that there is no justification for future Public Inquiries into matters relating to the nation`s nuclear power programme being as time-consuming as that considering the construction of the PWR at Sizewell because the main issues have now been adequately examined.

2.7. Since the Working Group was set up, the Government has announced its intention to privatize the ESI, and whilst no specific proposals for this have been published, we have taken some aspects of this development into account. If the Government commitment to nuclear power is to be fulfilled and if there is to be a continuing nuclear programme then it must ensure that, after privatization, utilities which possess nuclear plant have the technological resources, capitalization and tariff structures necessary to retain nuclear capacity as a safe and economically attractive option. In addition, Government must take account of the future market structure of the manufacturing and engineering industry serving the nuclear programme.

2.8. We wished to examine the consequences of the decision to build the PWR upon the national industrial and technological base, to ascertain whether there were opportunities for industry to develop and export new products, materials or manufacturing methods, and whether there would be resource implications regarding the requirements for safety, R&D or design. We consider these matters in Chapters 3,4, and 5. The effects of maintaining the capability for construction of both AGR and PWR are discussed in Chapter 6 and the advantages of replication of the PWR design in Chapter 7.

2.9. During our deliberations,it became evident that there were other matters of equal, if not greater, importance, relating primarily to the institutional arrangements for the design and construction of nuclear power stations and the processes by which these have developed over the previous decade or so. The history of the UK nuclear programme demonstrates the lack of a clear division of responsibilities between Government, the UKAEA and the utilities in respect of, for example, the extent of nuclear power generation in the UK, the choice of reactors, or the manner in which a nuclear station is purchased and constructed. We believe that this has been the root cause of the poor performance of previous UK nuclear programmes and note the difference in organizational and managerial arrangements for decision making in the UK with those in France where a highly successful nuclear programme is under way. Although the French mechanisms are more `dirigiste` than might be acceptable in the UK, they have influenced our own thinking regarding the removal of institutional blockages within the UK system.

2.10. If lack of stability in policies or technologies can explain the poor performance of the nuclear industry, then it is surely pertinent for us to question first whether the relevant decision making processes for the Sizewell PWR have been formulated specifically to avoid the mistakes of the past, and second whether they are likely to improve the prospects of the industry in the future. We note that many of the mechanisms which have been adopted for the construction of Sizewell, including, for the first time in this industry, technology transfer from a foreign company, are departures from previous practices. In Chapter 8 we examine whether the procedures for the the construction of the Sizewell plant adequately reflect the lessons of the past.

2.11. The Working Group arranged a series of meetings with companies and individuals with especial interest in the impact of the Sizewell `B' decision. The views of industry were also sought through questionnaires targetted at organizations directly involved in all aspects of nuclear power generation. This report is based on the discussions of the Group itself, the views of those consulted and subsequent consideration by ACOST.

CHAPTER 3...THE EFFECT OF SIZEWELL `B` ON UK MANUFACTURING INDUSTRY

Future plant requirements

3.1. The CEGB normally bases its construction programme for England and Wales on rolling forecasts of electricity demand, and, although there are uncertainties associated with such estimates, suggest that, by the year 2000, some 12GW of plant will have to be installed if demand continues to grow at the present 1.5% per annum.

3.2. Current CEGB plans for future plant are shown in Figure 3.1 which indicates that the coal-fired generating capacity will remain approximately constant. The increase in total capacity will be obtained predominantly by the construction of nuclear power stations, the initial tranche of which being PWRs of the Sizewell `B' design. In the period up to the end of this century, the CEGB will wish to construct up to 6 PWRs (of 1.1GW apiece) and about 3 or 4 coal fired stations (of about 1.8GW). Coal fired stations are already proposed for Fawley in Hampshire and West Burton in Nottinghamshire.

3.3. The other nuclear utility in the UK is the South of Scotland Electricity Board (SSEB) which possesses Magnox reactors at Hunterston `A` and AGRs at Hunterston `B' and Torness (the latter`s twin reactors are being commissioned), giving a current plant mix of 10% hydro, 60% nuclear and 30% coal.New coal capacity is expected to replace electricity lost through the eventual retirement of Hunterston `A` as well as to accommodate load growth and it is unlikely that any new nuclear generating capacity will be required before the next century.

Imports of components

3.4. One of our objectives was to ascertain whether the decision to build a PWR rather than an AGR is likely to have any significant impact upon the extent of imports of goods and services. This is of relevance since components for the PWR are fabricated in many countries throughout the world as a result of the generic PWR design having been accepted internationally. To some extent,

therefore, the CEGB`s procurement exercise was different from that for the AGR where the possibility of foreign supply of components for the Nuclear Steam Supply System (NSSS) was more limited.

3.5. Although Sizewell `B' will be the first civil PWR built in the UK, the import content has been reduced by the transfer of much of the technology from Westinghouse to UK companies, a process facilitated by the formation of PWR Power Products (PPP), a joint NNC/Westinghouse company. In the case of the primary circuit, (total cost around £140m), Westinghouse have placed sub-contracts in the UK for components such as the main feed water pumps, the reactor coolant pump motors and some parts of the steam generators. These sub-contracts were the subject of competitive tendering between UK firms which could meet the necessary quality assurance standards. It is expected that fuel will be manufactured by British Nuclear Fuels (BNFL) who hold the relevant Westinghouse licence, although there is no commitment to future purchase beyond the initial charge. A list of the major contracts awarded for the construction of Sizewell `B' is appended as Annex A.

3.6. The CEGB`s expectation is that about 93% of the cost of the hardware for Sizewell `B' will be allocated to UK firms although the percentage of the plant actually constructed from UK materials and components will be somewhat smaller. In some cases (such as the forgings for parts of the primary circuit) the facilities for manufacture of specialized components to the exacting standards required by the design are not at present available within the UK. In other cases (such as the structural steelwork sub-contracted to a company in the Irish Republic) it is the commercial judgement of the UK contractor which has determined the origin of the supplies. Although the turbo-generators for Sizewell are to be built in the UK at a cost of about £100m, orders valued at about £11.7m will probably be placed outside of the UK for the forgings for some of the rotors and blades (£2.2m) and also for the condenser (£8.0m) and heater (£1.5m) tubes. In addition, many of the forgings for the components making up the primary circuit will come from abroad, with Japanese forgemasters taking about £5.5m of sub-contract business.

3.7. Contracts for the remaining 7% of the Sizewell hardware cost which have been let abroad include the reactor pressure vessel (RPV) (to be fabricated by Framatome of France) and the primary circuit (the contract being let to Westinghouse). The major items include:-

	£m (1982/3)
Reactor Pressure Vessel	8
Control Rod Drive Mechanisms	4
Reactor Coolant Pump (excluding motor)	8
Reactor Internals	7
Parts of Steam Generators	13
Generator Switchgear	3
Total	43

3.8. Babcock Power Ltd (BPL) have produced RPVs in the past (although mainly for the UK nuclear submarine PWRs which are considerably smaller than the Sizewell reactor) and they have expressed interest in establishing the facilities necessary for construction of the RPVs for the ESI. Although they have estimated the initial costs to be around £10m, an extensive series of trials would be necessary to prove their capability. A programme of the scale currently envisaged by the CEGB (up to 5 further PWRs in the first instance) would, if the pressure vessels were manufactured in the UK, therefore attract an oncost of £2-3m per reactor.

3.9. The Sizewell RPV will be manufactured in France by Framatome who have also been responsible for the construction of the RPVs for all the French PWRs. The Framatome factory is currently under-utilized because of the deceleration of the French nuclear programme and will be even more so in the 1990s when the Sizewell `family' is due to be constructed. Although UK manufacture of the pressure vessel for future reactors may be feasible, there would inevitably be keen competition for an indigenous manufacturer.

3.10. For Sizewell, Westinghouse will supply a number of key components for the steam generators such as the fully machined and clad tubesheets together with the fully formed tubes and baffle plates comprising the tube bundle. For future PWRs, it is expected that progressively more of the manufacture could be carried out within the UK if the requisite infrastructure is established. Consideration of the ease of fabrication of the other components imported for Sizewell suggests that there are prospects for UK firms to be able to compete successfully for contracts on future UK PWRs. Many of the manufacturers currently involved in the Sizewell project have PWR experience through the construction of nuclear submarine propulsion units and there are one, or possibly two, UK companies able to manufacture components such as control rod drive mechanisms (built by Westinghouse in the USA for Sizewell) to the exacting tolerances required on nuclear plant.

3.11. Many of the items listed in para 3.7. could be manufactured within the UK for future PWRs although the investment required to build the necessary infrastructure is large. For example, the cost of the facilities for the construction of the RPV exceeds the value of a single vessel and the jigs, fixtures and forming equipment necessary for the fabrication of the reactor internals would cost about one half of the value of a single set of these components. With the possible exception of the RPV, a programme of up to 5 further PWRs should be sufficient for UK manufacturers to invest in the necessary facilities to compete internationally for the contracts for most of the items listed above. Expenditure on this scale would, however, be justified in the UK only if the ESI could be certain of building a tranche of fully replicated PWRs and was able to select a single tender supplier who could in turn be assured of sufficient orders to recoup his initial investment.

3.12. In the absence of a declared national programme UK industry has, understandably, not invested extensively in design and industrial (as opposed to safety) R&D facilities for civil PWRs. This is beginning to change and several UK firms have seen potential profit in developing their technical capabilities in manufacture of PWR components such as reactor pumps, valves and forgings. Other development work for the PWR in this category includes the harsh environment test facilities at NNC, a valve test facility at the CEGB`s Marchwood Engineering laboratories and a rig being constructed at Weir Pumps to

enable full flow testing of the primary pumps. We consider that, if manufacturing industry acquires the necessary confidence in the continuity of the forthcoming construction programme for both conventional and nuclear power stations, there should be further opportunities for UK industry to invest in the relevant plant and technologies to become, and remain, competitive against foreign suppliers.

3.13. Future procurement practices of the ESI are likely to be affected by the policy of the European Commission to `complete the internal market` in 1992. This involves further measures to discourage discrimination against firms from other Member States by enforcing a greater degree of tender advertising and implementing procurement procedures designed to foster competition between firms in different States. From the narrow procurement angle, `completing the market` might be considered to be beneficial since it would increase the pressures for more competitive pricing upon UK manufacturers. The amount of imports for future UK power stations would probably be increased through the implementation of such a policy although, equitably applied across EC countries, it could also result in greater exports of power station equipment.

Export Potential for AGR and PWR Components

3.14. The previous UK nuclear programmes, based on gas-cooled reactors, have not, in the past, been successful in generating exports and it is highly unlikely that any AGRs will ever be sold abroad. Some of the technology involved, (for example that relating to graphite performance or gas circulator design) is applicable to, and has indeed been utilized within, the High Temperature Reactor (HTR) programmes in USA and Germany. The probability of the UK ever embarking on a major development programme for the HTR is, however, small and we conclude that that the potential for component exports for gas-cooled reactors is limited.

3.15. Evidence to the Layfield Inquiry from manufacturing industry was scarce but was generally supportive of the view that export potential would be enhanced by the successful construction of a PWR in the UK. Although some suggestions were made that the advent of the PWR would not increase exports (Ref 3.1), evidence from Lord Weir (Ref 3.2) indicated that businesses could be built up on the export of special components for nuclear reactors, especially PWRs, and that export orders would be more numerous and easier to achieve when a UK PWR could be used as a reference point. We agree and suggest that there is a reasonable chance that UK firms can win contracts for substantial amounts of PWRs being built abroad, provided that they are internationally competitive compared to foreign companies which possess larger manufacturing capacities and have established repuations in PWR design and construction.

3.16. However, only the largest utilities can now afford the 900-1300 MW units which appear to be the internationally standard size for nuclear plant. Countries sufficiently advanced to absorb a nuclear station of that size will wish to involve and develop their own manufacturing industry, possibly by instituting technology transfer arrangements similar to those established between the UK and Westinghouse. If the UK is to be in a position to export complete nuclear islands there must be a credible main contractor able to establish a successful track record in PWR construction.

3.17. The PWR has become an established system worldwide and the maintenance and repair of these stations represents a major part of the world market for electrical generating plant and related equipment. The market for PWR components will be substantial. Export possibilities probably exist in generating plant, electrical equipment, civil contracting and such reactor components as pumps, valves, instruments, controls and safety and chemical systems. Information is available (Ref 3.3) indicating that the 90 on-line PWRs in the USA spent about $1.6bn on maintenance in 1985. These data are not incompatible with French information on maintenance costs of about FF3.5bn for their 30 plant in commercial operation in 1984 (Ref 3.4), again suggesting a figure of about $10-15m per year per reactor. In the USA, where a high proportion of their PWRs have been operating for a significant length of time, it appears that yearly expenditure on replacements and upgradings of obsolete

plant items is around $20m per station. Such figures have to be treated with some caution since they may include labour and service costs, but they suggest an international market for contracted services for the PWR of the order of $3bn per year.

3.18. In assessing the opportunities for UK industry to penetrate the export market for maintenance services, it must be recognized that a large percentage of the contracts will be tied to the original suppliers of the plant. A PWR designed to UK standards of safety would, however, undoubtedly constitute a significant point of reference for specialist component suppliers in furthering their opportunities in world markets. This is of particular importance to the manufacturers of control, instrumentation and safety systems who currently have relatively few opportunities to offer equipment with a proven capability in the specific environment of a PWR nuclear system. The technical endorsement provided by the Westinghouse licence should contribute benefically, facilitating the export of items for the primary circuit.

3.19. It is to the credit of UK industry that a number of British firms have in the past been successful in obtaining contracts for plant and components within PWRs and similar systems overseas. For example, Northern Engineering Industries (NEI) have exported 10GW of wet steam turbines for the CANDU reactor and the Turbine Generators Division of the General Electric Company (GEC) have a good record of exporting turbines for PWRs. To a large extent this has been due to the policies of both of these firms to orient their efforts towards the world market and not to rely on the domestic one because of the recent shortage of UK orders. A list of contracts carried out by UK firms for foreign PWRs is appended at Annex B.

3.20. We conclude that, since the UK domestic nuclear programme is now devoted to a reactor design which is compatible with those erected and operated elsewhere, the British capability in PWR steam system technology will increase the opportunities for exports for both PWR NSSS components and conventional equipment. It is possible that in the short term exports might be limited to items, including design and engineering skills, which are not critically dependent on technical endorsement in British PWR stations. In the longer term, however, the successful implementation of the Sizewell project will represent a useful UK base for additional business overseas. It should allow the maintenance of a UK design within the main stream of PWR developments. This, together with a build up of R&D and manufacturing capacities in UK companies should enable them to succeed in world markets if they are able to remain price competitive.

3.21. In view of the fact that the equipment suppliers to the power generating utilities operate in a high technology industry with a high level of value added, we consider it essential that the UK`s capability in this industrial sector is maintained and, if possible, improved. It is also particularly important for the nation to retain a strong domestic capability in view of the possible opening of the UK market to foreign competition through the EC`s proposals to `complete the internal market`. In the 1990s, the UK is likely to be amongst the leading EC constructors of power stations with a high level of demand for equipment, at a time when competitors` own domestic markets (especially that of the French) will be declining. Hence there will be large over-capacity in Europe ready to exploit any possibilities opened up by the UK demand.

Employment created by Sizewell `B'

3.22. The construction of any power station provides business for a wide sector of the UK`s manufacturing and construction industries. Assessments made in 1982 (Ref 3.5) indicate that the Sizewell project would require the services of between 50,600 and 61,800 man-years of effort in direct employment with possibly another 20,000 being maintained through the `multiplier` effect of the injection of funds into the UK economy. These estimates may be considered to be low since they slightly underestimated the proportion of the NSSS being constructed in the UK. Such data are not incompatible with the current CEGB estimate that, on average, about 10,000 jobs will be maintained for seven years in Britain`s industry and on site. At its peak in 1990 or 1991, the project will provide about 15,000 jobs, including about 3000 on site. Of the latter, about 1200 will be filled by people having permanent housing within daily travelling distance of Sizewell.

3.23. We have not attempted here to undertake a detailed study of the macro-economic aspects of the construction of Sizewell `B'. Neither have we evaluated the impact that a large public sector investment may have upon potential capital shortages and the economy as a whole. We note that some attempts have been made to gauge the impact of a nuclear power programme upon employment within the UK (particularly in the mining sector) (Ref 3.6), and the relative effects of alternative investments in the energy sector(Ref 3.7). Such efforts are insufficiently precise to be of much direct value to the ACOST exercise.

3.24. Similarly, we have not attempted to differentiate in depth between the employment levels maintained by a tranche of PWRs and that for a tranche of AGRs. Since the employment generated by such capital projects is approximately proportional to the total expenditure in the UK and, if we accept the relative costings given in the Layfield Report, it is reasonable to surmise that total UK employment for the PWR option will be slightly lower than that for AGR. On the other hand the enhanced prospects for PWR components which could result from the successful construction of a PWR, rather than an AGR may be beneficial to employment provided that companies and their component or system designs are internationally competitive.There are also wider economic benefits to be

obtained through the supply of cheaper electricity to the nation.

CHAPTER 4...R&D RESOURCES

Organizational Arrangements - Thermal Reactors

4.1. The customers for R&D related to thermal reactor operation in the UK are: the utilities (for work associated with their current and future programmes); the Department of Energy (DEn) (for work associated with nuclear safety matters) and BNFL (for work associated with the nuclear fuel cycle). R&D is carried out in the research laboratories of the utilities and BNFL and by the UKAEA and NNC under contract. The UKAEA role is to maintain an independent body of expertise on AGR and PWR safety issues funded by DEn, but a substantial amount of contract R&D work is also undertaken for the CEGB and SSEB under the Thermal Reactor Agreement (TRA).This research relates to about £25m worth of the UKAEA generic research related to thermal reactors which was previously wholly Government funded. Table 4.1 shows the breakdown of the UK nuclear R&D expenditure for 1987/88, categorized by funding source and reactor type.

4.2. R&D for the 14 AGR and 24 Magnox reactors in service or under construction in the UK is nationally coordinated. This is achieved through collaborative committees in the major technical areas which are themselves steered ,for the the AGR by the AGR R&D Requirements Committee. This is chaired by the CEGB and has senior staff from CEGB, SSEB, NNC, BNFL and UKAEA as members. Much of the AGR and Magnox R&D is applicable to either type of reactor. Currently, over 700 professional scientists and engineers are involved in the Gas Cooled Reactor R&D Programme with the CEGB and SSEB playing the dominant role in accord with Government policy which considers that R&D funding should be borne by the ultimate user.

4.3. The research priority for Magnox stations is to maintain their performance whilst retaining a high standard of safety. Long term safety reviews which will require substantial and probably increasing resources are currently being undertaken for these plant, including the low probability ("beyond-the design basis") fault scenarios which attracted renewed interest following the Chernobyl accident.

4.4. The most successful of the AGRs, those at Hunterston and Hinkley Point, have taken nine years to bring up to their present level of performance but even so it will only be in 1993, when the core is fully loaded with a new type of fuel, that these stations will be able to achieve full design output. The main R&D objective for the operating AGRs is therefore to provide the technical base to improve their performance towards design levels whilst maintaining safety against increasingly stringent criteria. All nuclear reactor systems inevitably need large amounts of R&D resources at the initial stages of their development but for the foreseeable future AGRs will continue to require substantial R&D expenditure. There are, for example, extensive programmes related to on-load refuelling above 40% Maximum Continous Rating (MCR), roof and standpipe integrity, the thermal and engineering performance of boilers and the formation of carbonaceous deposits on fuel and boiler tubes. Each of these problems requires resources not only for resolution in the short-term but also to carry out assessments of their impacts on safety as well as on core and station life-time.

4.5. PWR research is conducted on a national basis through the the PWR Research Requirements Committee which acts as a focal point for setting the R&D requirements, maintaining long term strategy and coordinating activity between CEGB, UKAEA, NNC and BNFL. The objectives of the programme were initially concentrated upon supporting the safety case for the introduction of the PWR into the UK, providing a technical base of UK-derived information, establishing UK participation in international research programmes and identifying areas of priority regarding safety and plant availability. Since the establishment of the Project Management Team (PMT) (see Paragraph 8.13), the PWR R&D programme has been principally focussed upon the pre-operational safety report for Sizewell B and the requirements for commissioning and eventual operation of the unit although longer term work generic to PWRs is also being carried out. The PMT also supports, inter alia, major contracts for the development and validation of component inspection methods, the qualification of equipment under harsh conditions and the testing of safety equipment and valves.

stated, in their evidence to us, that the establishment of the core of nuclear expertise originally designed to deal with AGR and Magnox R&D has so far needed only slight expansion to accommodate the extra problems which are unique to the PWR design. Were it not for the PWR, thermal reactor R&D resource requirements would probably have declined over the next few years.

Organizational Arrangements-Fast Reactors

4.9. The Government`s policy towards fast reactors was last reviewed in 1982 when it was considered that the existing development programme should be maintained to provide the UK with the option of series ordering once the technology became economically viable. The UK programme was considered to be best executed by collaborating with other interested European organizations and, to this end, an Inter-Governmental Memorandum of Understanding was signed in 1984 by the UK, Belgium, France, the Federal Republic of Germany and Italy. It was envisaged that there would be full industrial collaboration in a planned programme of reactor construction, reinforced by broad agreements between the utilities, R&D and design organizations and fuel cycle companies. The R&D carried out in the UK is part of this international programme and is managed by a European Steering Committee responsible for defining objectives and priorities. Coordination of the UK effort is achieved through meetings of representatives of the organizations comprising the UK nuclear and electricity generating industries, although the great majority of the effort is provided by the UKAEA who operate the 250MW Prototype Fast Reactor (PFR) at Dounreay and supply most of the R&D effort.

4.10. Government has a responsibility to underpin long term ventures in power generation and that has included the development of the fast reactor. R&D on this system is mainly carried out by the UKAEA and has in the past been funded primarily by Government.As shown in Table 4.1 total expenditure for the year 1987/88 is about £128m. In addition to funding the major part of NNC`s programme,the CEGB are now contributing some 30% of the UKAEA`s net expenditure (which is £102m in 1987/88) The level of R&D expenditure is considerably greater than the combined amounts spent on AGR and PWR although this relative position is understandable considering the different stages in the development cycles of these systems. About half of the fast reactor R&D cost is associated

4.6. The PWR is an international system and therefore extensive collaborative links have been established with overseas organizations who have an impressive volume of data and research experience related to the construction and operating characteristics of the PWR. The UK can take advantage of this database by carrying out its own programme and exchanging results with overseas organizations, thereby gaining access to research facilities which would otherwise be too expensive to maintain on a national basis. About £1.6M is currently spent each year in contributions to collaborative international agreements, divided approximately equally between CEGB and UKAEA. In addition there are a number of information exchange agreements, without financial payments,with the Nuclear Regulatory Commission (NRC) in the United States of America, the Electrical Power Research Institute (EPRI), Tennessee Valley Authority (TVA), Japan and the USSR. The value of information received from these international agreements in terms of data and access to overseas programmes is considerable. Such international cooperation is not possible with the AGR.

4.7. One such international cooperative project is the Steam Generators Owners Group (SGOG) which was originally set up in 1977 by 29 utilities, mainly from USA but also from Japan, France and Sweden, in response to the severe corrosion problems which were being experienced at that time in PWR steam generators. The CEGB joined SGOG in 1980 and also participated, with 47 other utilities, in a further programme initiated in 1983. CEGB has gained data from the programme itself as well as obtaining direct access to other utilities who were solving a variety of PWR steam generator problems. This information was used to support the Sizewell B safety case and has enabled the CEGB to influence and assess design changes which Westinghouse have incorporated in the Sizewell `B' steam generators.

4.8. It is difficult to compare the current R&D resource requirement for the PWR with that for the AGR since the two systems are at different stages of development. It might have been expected that the introduction of a new design of reactor to the UK would have necessitated a substantial increase in overall R&D resources deployed by the CEGB. This has not occurred because of the availability of considerable amounts of data from operational PWRs overseas and to internal redistributions of manpower within CEGB and UKAEA. The CEGB have

with the operation of the Dounreay reactor and its associated reprocessing

plant with some income being generated through sales of electricity.Comparisons with expenditures on AGR and PWR must take this factor into account.

4.11. It is essential that the ultimate users of fast reactor technology (the ESI) are sufficiently involved with its development to be able to make a commercial judgement on its viability. This implies that the ESI ought to have both a considerable input into the current decision making process and greater control over the future role of the fast reactor. There are indications that the CEGB is recognising this responsibility and is also cooperating actively with French and German utilities to achieve estimates of system viability. We also note, with approval, that funding of the fast reactor project is increasingly being transferred away from Government to the CEGB in recognition of the fact that this technology is appoaching commercialization, and recommend that this process should be encouraged. The question of the possible transfer of responsbility for the fast reactor from UKAEA to the ultilities is a matter which requires addressing simultaneously with the privatization of the ESI.

Availability of skilled resources

4.12. The general shortage of skilled manpower throughout the UK underlies any commentary on its availability within the nuclear industry. Professor Irvine of Manchester University summarized the situation when giving evidence to the recent House of Lords Select Committee on Civil R&D by saying, "the pool of qualified skilled manpower trained to undertake science and engineering research and capable of exploiting the new technologies...is grossly inadequate for the needs of the country" (Ref 4.1). There does not appear to be any immediate prospect of a significant increase in the supply of qualified scientists and engineers and current forecasts must be made on the basis of a maintenance of the current graduation rate.

4.13. Evidence presented to us from industry and the Professional Institutions suggests that there will not be a severe, immediate, shortage of available manpower in the fields of research, development or design as a result of the decision to change the direction of the nuclear programme from AGR to PWR. The CEGB have also argued that their R&D manpower totals have been scarcely affected by the PWR decision. In addition, the great majority of the design work for the PWR tranche has already been accomplished. However, if the PWRs are built too close together in time or if there is a significant, simultaneous, coal-fired power station building programme, there could be difficulties due to an inadequate supply of sufficiently well trained and experienced project managers and site personnel. (The need for a carefully planned phasing of construction is made again in paragraph 7.7)

4.14. The UK will need to maintain an adequate flow of skilled engineers into manufacturing industry in order to ensure that it has the capacity to keep up to world standards in the highly technological nuclear engineering sector. As the ESI approaches privatization there will be pressures upon industry to play a greater role in developing manufacturing processes and introducing the necessary levels of quality assurance procedures which will be applicable to future nuclear reactors. It is therefore critical that industry and Government recognize the need for skills in this area which, if neglected, will result in a flow of imports of PWR components as indigenous capabilities decline. Similar comments clearly apply to the production of PWR fuel where, for the first time, BNFL may be competing with foreign suppliers for the UK fuel services contracts.

4.15. The above considerations imply that most areas within the nuclear engineering sector will probably be in need of skilled personnel trained in all aspects of the PWR, especially if the future of the UK electricity generation is to be based upon this reactor type. There is a prevalent undercurrent of opinion amongst the Professional Institutions that retraining will be required to rectify the narrowness of application of many engineers operating in the nuclear sector. We note that the scale of the French nuclear programme has prompted the establishment of training centres specifically to provide designers, constructors and operators with the skills necessary to maintain the effectiveness of their PWR programme.

TABLE 4.1

Civil Nuclear R&D Expenditures (1987/88) by reactor type

	Source of funds (£m)			
Reactor Type	ESI(1)	DEn	Other(4)	Total
Magnox	6.8	-	-	6.8
AGR	32.5	11.3	22.2	66.0
PWR	39.6	6.6	1.3	47.6
Fast Reactor	35.8	75.2	16.7(2)	127.7
Steam Generating Heavy Water Reactor (SGHWR)	-	3.9	13.6(2)	17.5
General(3)	24.0	11.9	30.0	65.9
Total	138.7	108.9	81.8	330.4

(1) ESI data does not include capital expenditure

(2) includes receipts for electricity generated

(3) includes fuel cycle, generic nuclear and radiological protection research, nuclear materials management and support for facilities, but excludes disposal of radioactive wastes, decommissioning and research on the environmental effect of nuclear plant.

(4) Includes BNFL expenditure on fuel production and post-irradiation examination but not R&D on reprocessing.

CHAPTER 5..SAFETY

5.1. The licensing authority forexisting and future nuclear power plant in the UK is the Health and Safety Executive (HSE) and the task is carried out from day to day on their behalf by the Nuclear Installations Inspectorate (NII). It is for others to examine the methods and criteria by which it achieves its objectives, our intention being to ascertain how its procedures impact upon the economics of nuclear plant. Stringent safety and environmental requirements account for a substantial part of the cost of a nuclear power station and the NII'S expertise in the licensing of such a plant is recognized and well respected. We consider that it is essential that the Inspectorate continues to operate to this high standard otherwise the nuclear programme will be delayed, its economics impaired and public belief in it diminished. Although the NII has been uncomfortably short-staffed in the past, it is now substantially improving its strength following steps taken to bring salaries broadly into line with those offered by the power generating industry. It is important that the NII should be able maintain a sufficient cadre of engineers and other relevant skills, backed by the necessary managerial authority, to carry out its functions without delaying the construction of nuclear plant. We also consider that it would be advantageous if the NII increased the account it takes of factors such as the human element (prominent since Chernobyl) and ~~Three Mile Island~~) and to take a full part in discussions on the development of international standards of safety assessment.

5.2. The economic implications of a necessary level of safety in nuclear power generation are considerable although we recognize that there is a need for the risks to be reduced to very low levels. Our understanding is that in the application of the ALARP (As Low As Reasonably Practicable) to other forms of safety regulation, cost benefit techniques are frequently used to determine the levels at which such standards should be set. It is important that greater account is taken of economic implications of safety assessments of nuclear plant and we welcome the movement at the HSE and particularly within the NII towards implementing the recommendations in the Layfield Report (Ref 5.1) regarding an increased economic discipline on assessment criteria. We attach importance also to this being considered a feature of any progress towards the internationalization of safety standards, both as regards the PWR and fast reactor programmes.

5.3. Nevertheless, we believe that it will be necessary for NII to provide utilities applying for a licence with a clearer knowledge than has sometimes been the case in the past of the requirements under which the design will be licensed,so as to reduce inconsistencies and lead to a better utilization of resources amongst the assessors and the designers. Our understanding is that NII are now revising their Safety Assessment Principles in accordance with the recommendations of the Layfield Report (ref 5.1) and we suggest that, in the course of this revision, opportunities be taken to move towards what would amount to a more definitive statement of design requirements; that is to a more prescriptive mode of ALARP. Indeed it is our view that this is an essential prerequisite to the privatization of the ESI. A privatized utility could not accept the current uncertainty regarding the interpretation of ALARP, and would expect a much clearer statement of the HSE's licensing requirements at an early stage in the construction of the station. Similarly, it would be imprudent for any design and construction company to offer a fixed price for the whole or part of a station without ascertaining, in advance, the requirements of the Inspectorate, or even the time which they might take to reach a decision. This might in turn facilitate the use of cost and benefit techniques in relation to the safety parameters chosen.

5.4. The effect of increasing standards on the design of plant in an established series (such as that for the PWR in the UK) is also of concern in the same context, since alterations in safety requirements in the course of construction of a tranche of stations are likely to cause delays and could reduce the economic benefits inherent in plant replication. We note the NII`s evidence to the Layfield Inquiry when they made it clear that they had taken a deliberately conservative attitude to the licensing of Sizewell `B' so that there would be safety margins available to "operate as a reserve in favour of replication of the same design" (Ref 5.2). Such an attitude may be justifiable considering that Sizewell will be the first civil PWR in the UK, but it does emphazise the need for a more rigorous application of economic discipline to the safety criteria, possibly within a prescriptive framework for the tranche of units.

CHAPTER 6...REACTOR DESIGN CHOICE

6.1. In view of the fact that the CEGB`s application for Sizewell `B' involved the construction of a design of reactor new to this country it was necessary for Sir Frank Layfield to compare the economics of the PWR with those of the AGR. He noted that,although there had been improvements in the performance of the operating AGRs, there were inadequate data regarding Heysham II and Torness to determine whether the construction and operational difficulties which were the hallmarks of the early AGRs had been resolved satisfactorily. He did however suggest that if the performance of the AGR improved a reappraisal of reactor system choice might well be merited. The Secretary of State for Energy has however decided that there were no grounds for any reconsideration of the reactor choice and it has been accepted by the Government that the PWR is likely to have a lower lifetime cost than the AGR.

6.2. Sir Frank Layfield stated in his report that he felt unable to assess the consequences of granting consent for Sizewell B on the UK nuclear industry`s capacity to construct further AGRs since a decision in favour of a PWR at Sizewell could possibly lead to the eventual loss of the ability to construct an AGR. In their evidence to us the CEGB said that although there was no indication that the AGR had ended its useful life, they would prefer to see the investment in PWR exploited to the full. Their estimates suggested that lifetime costs of AGRs were some 20-30% higher than PWRs and they considered it realistic to exclude AGRs from their current programmes. An AGR design and engineering capability will be maintained until at least 1990. CEGB construction plans (described in Chapter 3) refer exclusively to PWRs and it would be reasonable to draw the inference that no more AGRs would be ordered by the CEGB.

6.3. The contracts placed by the ESI will enable NNC to keep an AGR team intact for support purposes for several years, although eventually the range of specialized skills and experience retained will become inadequate for building a new AGR. We were advised by NNC that, out of their current HQ workforce of 2000, 300 were AGR specialists with the remainder engaged on general power station engineering and project management (which was similar in work content

for AGR or PWR). We note in addition that NNC advised us that only a short period of familiarization is required for AGR specialists to be redeployed on PWR projects.

6.4. The resurrection of the capability to build further AGRs after a period of inactivity would result in a heavy financial penalty on the electricity consumer. Around £250m (1980 prices) was invested into the relaunch of the AGR programme at Torness and Heysham. Some £40m of this was allocated to special facilities at manufacturer`s workshops and subsequently recovered through the prices charged to the Generating Boards. It is to be expected that the majority of this £40m investment will be written off as the price to pay for the change from AGR to PWR, and the indications from industry are that this is a reasonable assumption to make. Similar manufacturing infrastructure costs would be incurred if, after a period of years, a decision were made to return to AGR construction.

6.5. The SSEB, in its evidence to the Layfield Inquiry, expressed a great deal of interest in the AGR probably reflecting the generally better performance of their AGRs compared with those in England. It is understood that the SSEB would probably be unwilling to introduce another reactor design on to its system if that were avoidable (Ref 6.1). However, SSEB would not require any new generating capacity for some years to come. If the rest of the ESI decide against retaining an AGR option, there will be a subsequent dispersal of design teams and erosion of AGR manufacturing capability. We believe that, unless a decision to build an AGR is made within the next few years, the disposal or re-utilization of the AGR infrastructure will necessitate the abandonment of this option. In view of the fact that the SSEB would not need another nuclear reactor on this sort of timescale, the chance that further AGRs will be built is clearly small.

6.6. The benefits of replication are only realized by building a tranche of units to the same design within a reasonably short period of time. Consideration of the UK's future ordering rate therefore suggests that there is only room for one reactor design in the UK. A mixed AGR/PWR programme would involve extra launch costs for a new AGR design and duplication of manufacturing facilities, design and safety teams, together with a reduced ability to obtain the advantages of replication. Although there may not be any technological problems in such a hypothetical mixed programme, there would be associated financial and skilled resource constraints.

6.7. We consider that the likely future ordering rate for nuclear reactors in the UK is too low to support facilities for the construction of more than one thermal reactor system. The decision to proceed with a PWR rather than an AGR at Sizewell has effectively pre-empted the choice of reactor for the foreseeable future and we therefore suggest that there is little merit in maintaining the AGR option.

6.8. Although the resources currently allocated to preparing a new design of AGR are small, we recommend that these resources be transferred to PWR at an early stage. It is, however, noted that there are (or will be after the commissioning of Torness and Heysham II) 14 AGR reactors in service and it is essential that sufficient resources are allocated to these systems to ensure that they achieve their full design capability consistent with a safe and efficient operation.

CHAPTER 7... REPLICATION OF THE PWR

7.1. The establishment of a clear and consistent ordering programme based upon a standard, replicable reactor design must be a high priority for the long-term efficiency of the industry since such a policy lowers the overall cost of R&D and investment in capital equipment. Identification of problems during construction and operation of the prototype can considerably reduce total costs for later plant with financial benefits accruing to both utility and manufacturer.

7.2. The cost of the Sizewell `B' station includes the costs of launching the PWR and the costs arising from the delay in the sanctioning of the project due to the extended Public Inquiry process. The launching costs are those costs which arise from Sizewell `B' being the first of a kind which would not be incurred on a follow-on station. The main components of this include the development of the reference design and safety case, the support work carried out by Westinghouse and Bechtel during the transfer of the technology and the cost of developing design and project management systems specific to the PWR project. There were also costs associated with keeping the project running for an extended period during the Public Inquiry hearing and preparation of the Inspector`s report.

7.3. The launching and delay costs for Sizewell `B' have been stated by the CEGB to be about £250m at April 1987 prices and preliminary estimates for the next PWR at Hinkley Point have confirmed that savings of this magnitude can be achieved. There may also be additional cost reductions through the more efficient working which is implicit in undertaking a repeat station, and lower prices that may be forthcoming from contractors on repeat orders which do not have to include development costs.

7.4. The best example of the process of replication of a standard design is that of the French nuclear programme. Although much larger and more intensive than that proposed for the UK it is worth examination since the benefits of a standardization policy have been maximized.At present, 55 PWR reactors have been ordered in France since the initial unit in 1970. There are 34 900MW, 20 1300MW and 1 1400MW reactors either in service or under construction.All of the 900MW reactors have identical nuclear islands and there is also a large degree of commonality in the 1300MW series.Figure 7.1 indicates that standardization of a series of units can have a beneficial impact upon construction times, and hence probably the capital costs, of replicated plant although there are some local fluctuations in the overall trend. The success of the French programme was also aided by by the fact that they selected the PWR design towards the end of a period of substantial development in the USA during which the initial difficulties associated with the system had been overcome.

7.5. The French strategic model is also worthy of comment because a key feature of their strategy is the long-range plan for supply of components, fuel and reprocessing together with the identification of their prime contractors for the important areas of work, aiming throughout at the maximum degree of standardization and replication. Such a policy has required considerable cooperation and interdependence between Electricite de France (EdF) and its suppliers, such as Framatome, as well as a rationalization of parts of the French nuclear industry.

7.6. In contrast to the French experience, it is noteworthy that, for the UK`s Magnox and initial AGR nuclear programmes, orders were shared out amongst several different consortia which essentially developed their own ideas within a broadly similar design concept. The potential advantages associated with manufacturing a replicated design were foregone.

7.7. The advice which the Working Group has received suggests that there ought to be a two to three year interval between Sizewell `B' and the following station intended to be at Hinkley Point. This would allow sufficient time for experience to be rationally incorporated into the design and construction procedures for subsequent stations and to allow for an orderly build up of the skilled teams and the manufacturing facilities required. Subsequent plant might then follow at slightly shorter intervals, of perhaps a year. This agrees reasonably well with the programme suggested by the CEGB.

7.8. We consider that a stable design for the system and its principal components is essential for the launch of a PWR industry. Very substantial resources have been injected into the launch of the Sizewell project and these should not be put at risk by introducing too many unproven components into the initial stations. We therefore welcome the intention to build the initial tranche of nuclear islands to the same design. Although the seismicity of candidate sites across the UK will vary, the specification of all the plant in the tranche to a particular excitation level would be a useful step in this regard. (Even so, the behaviour of the standard design on a particular site still needs individual assessment.) Sizewell B and the initial PWRs in the subsequent `family' will be constructed with twin 660 MW turbines which have many similar components to the current standard design utilized at other nuclear and fossil-fired stations. This will clearly reduce the requirement for development work to be undertaken simultaneously on the steam supply and electricity generation modules of the plant. The CEGB has suggested that it might wish to introduce a 1300MW turbine at a later phase of the Mark 1 PWR tranche although this ought to be implemented only after any initial difficulties with the nuclear side have been identified and corrected.

7.9. It has been suggested that "replication is only feasible for a limited tranche of stations programmed for sequential construction without a significant gap in the plant manufacturing programme" (Ref 7.1). A particular design of plant may be maintained for around five years before the combination of changes in safety criteria, efficiency considerations, manufacturing methods and the natural penchant of engineers and scientists to improve and modify a design necessitate the introduction of an upgraded version. We welcome the current intentions, first to limit the initial tranche of replicated PWRs to five or six, after which a Mark II version will be introduced, and second,

to attempt to build the PWRs which will follow Sizewell at approximately yearly intervals, after the initial 2-3 year gap in order to capitalize upon the manufacturing benefits of replication. It is important to note that the economics of the programme will be impaired if ordering is delayed due to very long planning inquiries or major changes in safety criteria during construction. The benefits of replication of the design are such that the privatization of the ESI ought not to impede the continuity of construction of the tranche of PWRs.

7.10. The power station construction industry, particularly that involved in nuclear plant, undertakes very large engineering projects which are characterized by a long time (up to 10 or even 15 years) for designing and building, combined with an even longer planning horizon. The complexity of these plants together with the current stringent requirements regarding the safety implications of a design necessitate the use of dedicated plant and the use of experienced designers. A competent nuclear industry is clearly not one which may be readily set up or redirected and this implies that a degree of long-range planning is necessary to ensure the development and maintenance of individual and collective skills. The timing of station ordering is therefore important in the development of a nuclear industry able to deliver products with due regard to the manufacturing benefits of replication. One of the principal criteria ought to be to ensure that the nation`s manufacturing facilities are evenly loaded over a reasonable period of time in order to ensure the most economic production. The erratic rates of ordering of power plant in the 1960s and 1970s are widely recognized to have caused considerable difficulties to the indigenous power plant industry. These are exemplified by Figure 7.2. which shows the fluctuations in both domestic and export ordering rates for the turbo-generator industry (comprising GEC and NEI) over the past twenty years.

7.11. In 1976 the Central Policy Review Staff (CPRS) recognized the difficulties caused by the lack of a steady ordering rate (Ref 7.2). It is worth quoting one of their conclusions here:

> "The absolutely essential condition for maintaining a viable power plant industry in this country in the long term is a firm, contractual commitment, ... by the Government and the CEGB to a steady ordering programme over at least a 10-year period. Without this commitment the industry will not be in a position to make the investments required to make it viable, let alone internationally competitive".

7.12. The CPRS comments were made at a time when the power plant industry was in a very depressed state due to a long period without receiving orders in the home market and we consider the sentiments to be equally applicable in the current environment. We suggest that it should be possible to devise a flexible ordering procedure involving commitments to the forward intention, to which later adjustments could be made in reasonable increments and with due warning.

7.13. The purchasing policies of the CEGB and SSEB are currently bound by conventions laid down by Government which state that commercial influence should be used, as a matter of enlightened self-interest, to help improve the competitiveness of suppliers. These procedures involve both formal and informal contacts between utilities and suppliers and we consider that it would be beneficial if these could develop into an even closer dialogue in order to identify mutual interests and requirements. Industrial needs and capabilities could then be allied more closely with a commitment to a long-term power plant planning scenario which could also incorporate technological developments jointly identified by the utilities and the manufacturers. It may be argued that it is difficult to plan ahead in this manner since long-range electricity demand forecasts have rarely been accurate. It has also been suggested that plant ordering rates and the optimum coal/nuclear generating mix are matters for the utilities alone and that equipment suppliers ought to be able to make investments on the basis of their individual commercial judgements. We consider however that such arguments ignore the national importance of the power generation sector of the economy and recommend the development of a co-ordinated strategy for power plant development as an important objective for

the utilities and industry. The primary advantage of such a strategy would be to provide the framework to increase the competitiveness of UK manufacturing industry.There would also be potential for increasing the UK content of power plant through identification of strategically important sub-contractors.

CHAPTER 8... PROJECT MANAGEMENT

Background-The Evolution of NNC

8.1. Over the last few decades there has been little stability in the arrangements employed for designing and constructing nuclear plant. This is clearly shown in Figure 8.1 which illustrates the process of consolidation of the remnants of the five consortia responsible for the original Magnox programme and the three for the first phase of AGRs into NNC. This lack of stability, combined with fluctuations in location of the responsibility and accountability for the implementation of technological change, has considerably impaired the record of the UK nuclear industry.

8.2. We consider it fundamental to the success of any nuclear programme that there exists a robust policy framework within which the relevant industries can develop and retain the necessary skills and technologies. We set out in this Chapter some of the elements of that framework which must be addressed in order to improve the national benefit of a nuclear programme, in particular the requirement for a workable market structure and the establishment of clearer lines of management accountability and responsibility. Other factors, such as the undoubted need for quicker planning approval, may be important but are peripheral to our central theme.

8.3. Inadequacies in the organizational arrangements for the UK nuclear power programme were evident in the first phase of AGR construction. It started with three consortia, the Nuclear Power Group (TNPG), the British Nuclear Design and Construction Ltd (BNDC) and the Atomic Power Construction Ltd (APC), each building reactors to slightly different designs and specifications. This resulted in a large bill being paid by the electricity consumer and a number of what were in effect prototype stations, none of which has yet reached its design output levels. In 1973 NNC together with its operating arm, the National Power Company (NPC), were created specifically to provide the required stability in project management by consolidation of the existing AGR construction organisations.

8.4. The concept was for this company to take eventual responsibility for the design and construction (D&C) of all future nuclear power stations. The intention was that financial and managerial strength would be provided by GEC, who held 50% of the shares. However, disagreements over reactor choice and an absence of orders were major factors contributing to the lack of success of these arrangements. The two-tier NNC/NPC has since been rationalized to a single tier structure together with a reduction in the GEC shareholding and the removal of their supervisory management function.

8.5. NNC currently has a shareholding of 35% Government (through the UKAEA), 30% GEC and the remaining 35% British Nuclear Associates (BNA). The last of these is a "holding company" owned by a group of ex-shareholders of NNC's predecessors TNPG and BNDC, comprising FKI Babcock plc, Sir Robert McAlpine & Sons Ltd, NEI plc, Taylor Woodrow Construction plc, Dickinson Robinson Group UK Ltd, Whessoe plc and Davy McKee Nuclear. NNC have recently built the nuclear islands for Heysham II and Torness, with good performance in respect of time and cost.

Project management procedures

8.6. There are two principal methods which are generally recognized for ensuring an adequate project management structure. First, an independent engineering company can be employed to act on behalf of the client (the utility) to manage the whole operation, usually on the basis of a fixed fee and reimbursable expenses. Such an architect-engineer designs the complete station (including the safety case), procures the NSSS and conventional plant (including the turbo-generators) and is responsible for cabling, piping, control, instrumentation, heating and ventilation as well as supervising the site work. The architect-engineer contracts for the NSSS from a reactor vendor (such as Westinghouse or Framatome) who supplies the design and hardware for the reactor itself, usually also on a fixed price basis. Some utilities can carry out the architect-engineering themselves (the CEGB does this for its conventional plant) and others (such as EdF or TVA) additionally employ their own work forces. The SSEB currently favours the use of external architect-engineers.

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8.7. In the second method a D&C organization is controlled by equipment suppliers and the utility contracts with this single firm, usually on a fixed price basis. In this case the engineering company acts on behalf of, and with the agreement of, its suppliers to put the whole construction package together. Companies such as KWU in Germany, who also manufacture reactor NSSSs, carry out architect engineering for nuclear stations on this basis. The shareholding arrangements of NNC would suggest that it should operate in this manner, with a procurement policy controlled by its shareholders.

8.8. Both of these methods are feasible and the decision on which is more appropriate depends on the relative strengths and weaknesses of the utility and of the D&C companies available to it. The original concept for the Magnox and AGR nuclear power stations was that the D&C consortia would take total responsibility for building the stations (method 2). Although this concept appears to have been reasonably satisfactory for the Magnox plant, the arrangement became severely distorted during the first AGR phase with the CEGB becoming more and more involved in the construction process. The reasons for this are complex, but a contributory factor was the inability of the D&C companies to shoulder the full contractual responsibilities for building the stations.

8.9. Attempts to reverse this blurring of responsibilities were made in 1979 when the Secretary of State for Energy declared that NNC was intended to be built up "into a strong and independent design and construction company, fully able to supply nuclear power stations at home and abroad efficiently" (Ref 8.1). This, combined with its shareholding composed of equipment suppliers, implied that it was intended that, at some time in the future, NNC would be capable of taking total responsibility for the design and construction of a power station, with an arms-length relationship with the CEGB. It was recognized that this evolution would take time and that it would be necessary for NNC to concentrate initially upon supplying nuclear islands. The intended formation of PPP, 50% owned by each of NNC and Westinghouse, would be a step along this route. PPP would hold the sub-licence for the complete Westinghouse PWR system and would, for Sizewell, supply all the nuclear auxiliary systems as well as project-manage, erect and set to work all the nuclear plant. Future

PWR orders could be dealt with by the joint company directly, with the prospect that it could grow to supply a complete NSSS, possibly with some manufacturing capability of its own. This would be especially worthwhile if it were decided to buy out Westinghouse`s interests in PPP.

8.10. However laudable these intentions,they have been nmot been realized in practice.The low capitalization of NNC and the wish of the SSEB and CEGB for an open procurement policy have been contributory factors in preventing the company from accepting liability for major contracts typical in modern power station construction. In 1979 the CEGB and SSEB placed the major contracts for Heysham II and Torness directly with equipment suppliers in order to provide the necessary financial protection, NNC acting only in the role of the utility`s agent. Similarly, NNC`s shareholders were not prepared to accept firm price contracts for Sizewell `B' because the provision of performance guarantees would have entailed too great a commercial risk.

8.11. The CEGB has reduced its own financial exposure for Sizewell `B' by contracting the primary circuit, which comprises some 10% of the total station cost, to Westinghouse who were prepared to give the necessary performance guarantees. The expectation is that, for future PWRs, contracting for the NSSS through PPP will retain Westinghouse experience and will ensure that the financial and technological risks are not all borne by the CEGB.

8.12. NNC regarded the arrangements for Heysham II and Torness as adequate and would have preferred a similar mechanism for the Sizewell `B' project, although it is clear that the CEGB were not similarly content. In 1981 the Monopolies and Mergers Commission (MMC), in its report on the CEGB, advocated certain changes in order to provide a more unified control over the project and to enable a more realistic assessment to be made of the financial risks involved (Ref 8.2). Further modifications were made during the progress of the Layfield Inquiry after Sir Alastair Frame had criticized the project management procedures then proposed for Sizewell `B' (Ref 8.3).

8.13. The Sizewell project is controlled by a Project Management Board (PMB)

which reports directly to the CEGB Board. It is responsible for settling policy for project management consistent with CEGB strategic objectives and is chaired by a CEGB Board member, although with Directors drawn from both NNC and CEGB. Executive responsibilities are exercised by a Project Management Team (PMT) which is accountable to the PMB. The procedures currently being used for the project incorporate the primary principle that the responsibilities and accountabilities falling on the CEGB are such that it should undertake the leadership of the project itself, although it is evident that the arrangements do not correspond to either of the generally accepted methods outlined above. For the long term more appropriate procedures with sufficient delineation of design authority should be introduced.

8.14. The PMT currently operates in a fashion which is not ideal for the long-term since, although reporting to the CEGB, it is located in the NNC headquarters at Knutsford and employs approximately equal numbers of NNC and CEGB staff (with some of the latter being transported daily from their base at Barnwood, Gloucestershire). This is hardly the most effective manner in which to use highly skilled personnel. In order to allow the NNC to innovate and develop the company as an independent entity, these short-term arrangements regarding the secondment of NNC's skilled resources to the CEGB via PMT should not be maintained for the remainder of the projected PWR tranche.

Project management- Possible Solutions

8.15. The CEGB's Generation Development and Construction Division (GDCD) at Barnwood has a significant design and construction function in both nuclear and conventional generation. It performs the whole of the architect engineering for fossil and hydro stations and undertakes a substantial amount of the Sizewell project with a large body of skilled personnel allocated to the physically separate PMT. NNC's skill base is considerably narrower although it is highly specialized in NSSS technology for AGR, PWR and fast reactors. (It was, however, chosen to engineer the Inverkip oil-fired station by the SSEB since this latter organization has no equivalent of the CEGB's GDCD.) We suggest that consideration should be given to concentrating the relevant resources and management responsibilities in one organization so that the design, procurement and construction of future civil nuclear power stations can be carried out to

time and cost. The formation of such an organization from an amalgam of parts of NNC and GDCD would also enable the formalization of the arrangements for manpower distribution between the CEGB and NNC described in paragraph 8.13. although the procedures for merging these resources depend on a large number of factors, not the least being the Government`s resolve to privatize the ESI.

8.16. The arrangements for the design and construction of civil nuclear power stations, and especially the CEGB/NNC interface, have been considered to be of great importance. We recognize, however, that in the design and construction of PWRs for submarines, there is a large amount of relevant technology (for example in reactor physics, plant dynamics, thermal-hydraulics, materials behaviour and stress analysis) which is either common or similar to both systems. Expertise gained in the submarine PWRs will be applied to the Sizewell `B' project in a contract (worth £5-10m) for inspection of the RPV. We also understand that arrangements are currently being made which will encourage technical exchanges between the company concerned, Rolls Royce and Associates, and the CEGB, and we welcome this development. Nevertheless, it appears logical that, in an industrial sector which is highly demanding in terms of both technological and skilled resource requirements, there is a case for establishing a D&C company which is able to draw on all the nation's resources and avoid duplication of effort.

8.17. The CEGB has experience in both nuclear and non-nuclear projects and it

might wish to take greater control of the management of its own construction projects. If it is privatized as a monolithic organization, it would be possible for its successor to group together all the expertise for designing and constructing power stations becoming its own architect-engineer, for nuclear as well as non-nuclear plant. It would possess the intrinsic strength, technological expertise and administrative infrastructure necessary to maintain close management control over the research, design and construction of new plant in addition to the repair and upgrading of existing stations. The architect-engineering activity would in that case need to be a wholly owned subsidiary of the utility, with representation on the Board from experienced project managers. It is, however, doubtful whether such an organization would possess the incentive to contract for work either from other UK utilities or from foreign customers. Past experience has also shown that when the customer is totally responsible for design, there is a tendency towards over-engineering and a loss of the important advantages of replication which the PWR should offer.

8.18. It is also necessary to examine the possibility of all the relevant design, construction and possibly research expertise in the UK residing in a company in the private sector separate from the utilities. We suggest, however, that, if privatization results in a single generating utility within England and Wales and which retains considerable technological and engineering expertise, then such a solution would be unlikely to succeed. The recent relationship between the CEGB and the NNC is sufficient evidence for such a conclusion. If, however, the Government resolves that the Generating Boards are to be further divided on privatization, then the resulting companies may not wish to control the whole research, design and procurement operation for power stations of any description. Under these circumstances, we consider that it would be necessary for the D&C expertise (both nuclear and conventional) to be located in a private sector company separate from the utilities. Although such an organization would probably be based upon NNC, it is suggested that its viability would be enhanced if it, or a parent, engineering company, possessed a greater spread of interests than simply nuclear power station construction.

8.19 Many factors, principally the capitalization and shareholding distribution, would determine whether such a D&C company would accept financial risks or simply manage the construction process on a management fee basis. In this scenario, it would be necessary for the utilities to retain only sufficient skilled resources to assess the designs submitted to them, and to maintain the balance in commercial negotiations. There may even be possibilities for the involvement of the consulting engineering organizations which have not played a significant role in the power generation industry for many years but which have been active in many of the UK`s other large scale construction projects.

8.19. Although we have outlined above two possible ways to improve the arrangements for nuclear power station construction in the UK, we do not make any specific recommendations regarding the optimum solution since we recognize that such a task would be beyond our remit as well as our resources. We do, however, recommend that when considering the manner of privatization of the ESI the Government also takes full account of the ensuing market structure for the design and construction of power plant. We also recognize that, whilst much restructuring could be effected without recourse to legislation, the privatization of the ESI provides the Government with a splendid opportunity to bring about the radical changes required to establish a flourishing nuclear industry which is internationally competitive in the 1990s and beyond.

8.20. If, nevertheless, it is eventually decided not to privatize the ESI, we recommend that steps still ought to be taken to alter the relationship between NNC and CEGB. As already suggested,these should centre around a unification of the national design and construction skills. Depending on the nature of any changes, there is merit in NNC rearranging its capitalization and shareholding so that its R&D capability and latent manufacturing capacity,including the embryo reactor vendor PPP, may be more effectively utilized.

8.21. We see no reason for the Government to hold a substantial stake in any D&C company and recommend that, even if the electricity generation and

distribution organizations are retained in the public sector, the Government`s shareholding in NNC should be released into the private sector. We make no recommendations on the manner of the release or of the future ownership of the shares.

8.22. Whatever the outcome of the Government`s considerations regarding ESI privatization, it is profoundly to be hoped that consequential arrangements for the nuclear power component will not in future be dominated by the short-term industrial compromises which have in the past often left managerial authority without a sharp focus.

GLOSSARY

ACARD	-	Advisory Council on Applied Research and Development
ACOST	-	Advisory Council on Science and Technology
AEI/JT	-	Associated Electrical Industries/John Thompson Nuclear Energy
AGR	-	Advanced Gas Cooled Reactor
ALARP	-	As Low As Reasonably Practicable
APC	-	Atomic Power Constructions Ltd
BNA	-	British Nuclear Associates
BNDC	-	British Nuclear Design and Construction Ltd
BNFL	-	British Nuclear Fuels Plc
BPL	-	Babcock Power Ltd
CEGB	-	Central Electricity Generating Board
CPRS	-	Central Policy Review Staff
D&C	-	Design and Construction
DEn	-	Department of Energy
EC	-	European Commission
EE/BW/TW	-	English Electric/Babcock and Wilcox/Taylor Woodrow Atomic Power
EEC	-	European Economic Community
EdF	-	Electricite de France
EPRI	-	Electrical Power Research Institute
ESI	-	Electricity Supply Industry
GDCD	-	Generation Development and Construction Division (of CEGB)
GEC	-	General Electric Company
GEC/SC	-	General Electric Company/Simon Carves Atomic Energy Group
GW	-	Gigawatt
HTR	-	High Temperature Reactor
KWU	-	Kraftwerk Union
MCR	-	Maximum Continuous Rating
MMC	-	Monopolies and Mergers Commission
MW	-	Megawatt
NEI	-	Northern Engineering Industries
NIES	-	Northern Ireland Electricity Service

NII	-	Nuclear Installations Inspectorate
NDC	-	Nuclear Design and Construction Ltd
NNC	-	National Nuclear Corporation Ltd
NPC	-	Nuclear Power Company Ltd
NPPC	-	Nuclear Power Plant Company Ltd
NRC	-	Nuclear Regulatory Commission
NSHB	-	North of Scotland Hydro-Electric Board
NSSS	-	Nuclear Steam Supply System
PFR	-	Prototype Fast Reactor
PMB	-	Project Management Board
PMT	-	Project Management Team
PPP	-	PWR Power Projects
PWR	-	Pressurized Water Reactor
R&D	-	Research and Development
RPV	-	Reactor Pressure Vessel
RR&A	-	Rolls Royce and Associates
SGHWR	-	Steam Generating Heavy Water Reactor
SGOG	-	Steam Generators Owners Group
SSEB	-	South of Scotland Electricity Board
TNPG	-	The Nuclear Power Group Ltd
TRA	-	Thermal Reactor Agreement
TVA	-	Tennessee Valley Authority
UKAEA	-	UK Atomic Energy Authority
UPC	-	United Power Company Ltd

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3.2. Evidence to the Sizewell `B' Public Inquiry by Lord Weir

3.3. Nuclear Engineering International, p5, July 1987.

3.4. J.Leclerq, "La maintenance des Centrales Nucleares",Rev.Energ.No 371,pp80-87,Feb.1985

3.5. F.Fishwick, "The effects on employment within the United Kingdom of the construction of Sizewell `B` PWR station". Evidence to the Sizewell `B' Public Inquiry.

3.6. Evidence to the Sizewell `B' Public Inquiry by the Greater London Council and the National Union of Mineworkers

3.7. Evidence to the Sizewell `B' Public Inquiry by the Town and Country Planning Association

Chapter 4 ..R&D Resources

4.1. The House of Lords Select Committee on Science and Technology Report

NII	-	Nuclear Installations Inspectorate
NDC	-	Nuclear Design and Construction Ltd
NNC	-	National Nuclear Corporation Ltd
NPC	-	Nuclear Power Company Ltd
NPPC	-	Nuclear Power Plant Company Ltd
NRC	-	Nuclear Regulatory Commission
NSHB	-	North of Scotland Hydro-Electric Board
NSSS	-	Nuclear Steam Supply System
PFR	-	Prototype Fast Reactor
PMB	-	Project Management Board
PMT	-	Project Management Team
PPP	-	PWR Power Projects
PWR	-	Pressurized Water Reactor
R&D	-	Research and Development
RPV	-	Reactor Pressure Vessel
RR&A	-	Rolls Royce and Associates
SGHWR	-	Steam Generating Heavy Water Reactor
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Chapter 5..Safety

5.1. The Report of the Sizewell `B' Public Inquiry ,para 35.8

5.2. The Report of the Sizewell `B' Public Inquiry ,para 51.8

Chapter 6..Reactor Design Choice

6.1. Evidence to the Sizewell `B` Public Inquiry by the SSEB.

Chapter 7..Replication of the PWR

7.1. "Advances in Power Station Construction",CEGB,Barnwood,Pergamon Press 1985

7.2. " The Future of the United Kingdom Power Plant Manufacturing Industry", Report of the Central Policy Review Staff,1976

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8.2. The Monopolies and Mergers Commission,"The Central Electricity Generating Board:a report on the operation by the Board of its system for the generation and supply of electricity in bulk",London 1981.

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CONFIDENTIAL

Reference No E 0495

PRIME MINISTER

FUSION:JET

E(ST) at 5pm on 26 January

Paper by the Secretary of State for Energy E(ST)(88)2
Note by the Chief Scientific Adviser E(ST)(88)3

DECISIONS

Mr Parkinson's paper gives the opportunity for a discussion on our general approach to fusion research. It asks for specific decisions on:

i. Extension of the JET project from 1990 to 1992.

ii. Options for reducing the costs of decommissioning JET.

iii. Approach to the Next European Torus (NET), the next stage of EC work beyond JET.

iv. Reduction of the Community Fusion Programme for 1987-91.

v. Approach to ITER, the proposed joint venture between the EC, USA, USSR and Japan.

The Chief Scientific Adviser also suggests consideration of:

vi. The case for the non-JET parts of the AEA's expenditure.

MAIN ISSUES

Extension of JET

2. The JET project is now due to end in 1990. There is pressure for an extension to 1992. JET itself and the Commission support this. A unanimous decision in the Council of Ministers would be necessary.

CONFIDENTIAL

3. The first question is the cost of the extension. This is not stated clearly in Mr Parkinson's paper. Annex A of Mr Fairclough's paper suggests (last line) that the total cost of JET to the UK is now about £20m a year. But there is more to the cost of extension than that. Mr Parkinson says (attachment, para 16) that if JET were stopped in 1990, decommissioning costs might be £64m instead of £148m. The £80m difference apparently represents an additional cost to us of extending JET, if we cannot persuade the South Oxford District Council to relax their requirements on decommissioning or the Commission to share part of the costs.

4. You may also want to ask why extension of the project's life is now necessary. Mr Parkinson's paper (attachment, para 10) refers to slippage. If there has been slippage, the next question is whether further extension will be necessary. Mr Fairclough thinks (para 5) that it is 'highly likely' that another extension will be required. Can we be sure that if we agree to extension now that will be the end?

5. The most fundamental question is: what is the benefit to the UK of prolonging work on JET? Mr Parkinson says (para 4) that the energy policy case for substantial expenditure on fusion is very weak, since it will not be commercial until 2040-2050 and perhaps much longer. Mr Fairclough believes that there is a case for expenditure, but at a much lower level. You may wish to ask what exactly is the case for the extra expenditure. Is it for energy policy, for basic science, or for diplomatic reasons?

6. On energy policy, you might also ask whether we need expenditure on both the fast reactor and fusion. Is there a case for postponing decisions on fusion until E(ST) has also considered the review of the fast reactor now under way?

7. Both Mr Parkinson and Mr Fairclough want to continue fusion reesearch but at a lower level. Mr Parkinson suggests (para 9d) setting 'milestones' for progress, and that tritium should be loaded only after a careful assessment. Mr Fairclough suggests trying to stop or reduce payment of the host country premium, now costing £6-7m a year. How can we achieve this? Should we try to impose conditions on the extension?

Decommissioning costs

8. These were originally estimatd at £20-25m. The latest estimate is £148m. Two questions arise:

- Should we try to persuade the South Oxford District Council to defer the restoration of the site to green field from 2000 to 2200? This would save about £80m.

- Should we try to persuade the Commission to bear part of the cost? Mr Parkinson wants to make an approach now, but Mr Fairclough thinks we should try South Oxford first. You might want to consider whether to threaten a veto on the extension if we do not get help with the costs. Mr Parkinson advises against this.

Next European Torus (NET)

9. Mr Parkinson's provisional view is that the UK should not participate in a successor project to JET. Mr Fairclough wants to restrict current work on NET to minimal design, and reduce the expenditure already planned in the Community Fusion Programme. As Mr Parkinson says, no formal decisions are needed now. But you may want to explore the risk of gradually slipping into a commitment, especially since the Community Fusion Programme proposes expenditure of £50m on NET. How do we minimise this

risk? How do we achieve reduction of the £50m, as Mr Fairclough proposes?

Reduction of Community Fusion Programme

10. The draft Community Fusion Programme for 1987-91 provides for expenditure of 1005 mecu (£694m) over that period. Mr Parkinson suggests seeking to reduce this to 900 mecu. This might also help to cut expenditure on NET. You may want to ask why the reduction should be only to 900 mecu and to discuss how it can best be achieved.

ITER

11 The USA has proposed study of the conceptual design of a next step fusion reactor, ITER, by EC, USA, USSR and Japan. The Commission want to agree. A decision is needed by mid-February. Both Mr Parkinson and Mr Fairclough support acceptance. The arguments for this are:

a. There is no commitment beyond 1990.

b. The cost would be met from within the Community Fusion Programme.

c. The Council of Ministers have already agreed the Commission's negotiating tactics. Withholding approval now would be a change of course.

d. Only a qualified majority is needed for approval.

e. Participation would deflect pressure for an early decision on NET.

f. In the longer term, a wider international sharing of expenditure should reduce costs.

You may however want to explore the danger of slipping into a commitment. If ITER work on the conceptual design is successful by 1990, will there not be pressure to go to the next stage? Is there a risk that spending on ITER will be added to spending on NET?

Other Department of Energy expenditure on fusion

12. Mr Fairclough points out (para 8ii) that the Department spends £15m a year on fusion programmes other than JET. This is barely mentioned in Mr Parkinson's paper. You could ask him for a review of the case for this expenditure.

Timing and next steps

13. A decision on ITER is needed by mid-February. But the decisions on extending the life of JET and the Community fusion programme do not need to be taken until the 29 June Research Council. If therefore you thought the Sub-Committee was not ready to take final decisions you could ask for further work on:

(a) Our negotiating tactics

covering for example, how to:

- Establish milestones for expenditure during the JET extension period, and other means of limiting it.

- Get a contribution by the Commission to decommissioning costs.

- Get a reduction in host country premium.

- Cut planned expenditure on NET.

- Cut the Community Fusion Programme for 1987-91.

(b) The case for the non-JET components of the AEA programme.

HANDLING

14. You will want to ask the Secretary of State for Energy to introduce his paper. The Foreign and Commonwealth Secretary will be interested in the international aspects and the Chief Secretary, Treasury in any possible expenditure implications. The Chief Scientific Adviser will also wish to comment.

G W MONGER

Cabinet Office
22 January 1988

PRIME MINISTER 22 January 1988

JET

The Scientific Case

The most productive reaction for energy production occurs between the two heavy isotypes of hydrogen - deuterium and tritium. Temperatures in excess of one hundred million degrees centigrade are required in order to convert the fuel from a gas into a reactive plasma, which consists of ions derived from the nuclei in the gases. Plasma has been named 'the fourth state of matter', and the principle work at JET has been to determine how plasmas behave under different conditions of temperature, pressure and magnetic field intensity.

So far, tritium has not been introduced into the reaction chamber which has operated only with hydrogen and deuterium plasmas. The primary purpose of building the reactor was to develop our knowledge of plasma behaviour to the point where tritium could be introduced. This is an essential step in the development of a commercial fusion reactor based on magnetic confinement. It would therefore be scientifically perverse to stop the work just at the point where tritium appears capable of introduction.

The three initial tasks set for JET were:

- confinement: how the plasma would hold together under different magnetic field conditions, what densities could be achieved and for how long;

- anomolous transport: how the plasma's tendency to break up into small 'islands' of turbulence could be solved;

- interactions with the vessel wall: this has proved the most difficult problem to crack because the plasma tends to wander off track towards the walls of the vessel and thereby cause contamination problems.

I am told by Paul Rebut, the JET Director, that these problems will be solved sufficiently to introduce tritium into the reactor by early 1991. The equipment for so doing should be ready by mid-1990 but there will then be an interval of at least six months before the team has the confidence to introduce tritium. Once this is done the torus machine will be unapproachable behind its three metre concrete walls with all adjustments by remote handling. After the plasma behaviour is sufficiently understood to introduce tritium, fusion reactions producing fast neutrons will commence and the knowledge so obtained used for design work on the next magnetic confinement reactor - the NET (next European torus).

The experimental phase with tritium is scheduled for completion within two years. However, the JET record has been behind timetable and, compared with original estimates, the programme is already two years late. Delays of this order for such a programme should not be regarded as black marks. It does however indicate that conclusion in 1992 is optimistic and a further year is probable.

The scientific case for completing the work on JET is sound. The argument for proceeding with NET is different and one must look both to the economic case and the greater scientific options that are now available compared with the position when the JET programme was agreed in 1977.

The Economic Case

The Department of Energy paper has a subtle thread throughout which pre-supposes that the Fast Breeder Reactor

(FBR) will be developed and, by implication, that the vast expenditure at Dounreay of some £100m per annum will automatically proceed.

Last week we were discussing how the basic economics for nuclear energy in general have changed over the past fifteen years. This has many important implications upon the case for deploying FBRs and the urgency for developing fusion. Although the Chief Scientific Adviser and the Department of Energy do not want to raise the issue of Dounreay at this meeting, I cannot see how one can approach any sensible overall plan for fusion without fundamental reassessment of the FBR programme in the light of changing economics, and safety priorities.

The Costs

I have avoided numbers in this paper. The Department of Energy annexes have ample data cross-correlating European versus UK fusion expenditure. Indeed one would imagine that proper accounting of the expenditure is far more important than whether it achieves any benefit!

One figure which we can actually do something about, is the 10% host premium, currently costing £7m per annum, and unique among major scientific projects. The other is the vast increase in estimated decommissioning costs which now extend upwards to £150m if the tritium experiment proceeds. We should fight both these expenditures.

After 1990, there is no obligation to continue a host premium and we should simply refuse. The decommissioning costs should, in all equity, be shared. Since the JET programme was set up, there has been a great increase in our understanding of the dangers of radiation leading to enhanced safety requirements. Straightforward ocean disposal of waste is therefore no longer acceptable.

Decommissioning costs may be reduced by a delayed dismantling programme since the basic danger is from irradiated atoms with a moderate half life compared with plutonium and uranium fission fragments. The proposals for extending the planning permission should therefore be supported, at the same time as a strong plea for European assistance with decommissioning.

Alternative Methods of Fusion

At the time JET was agreed, magnetic confinement via the tokamac configuration using torroidal magnetic fields seemed the only possible way to achieve controlled thermo-nuclear fusion. There are now two other fundamentally different methods which some scientists support. Both have achieved limited hydrogen fusion with some energy production. Like the fusion reactions in JET however, they have not yet produced anything like the energy release which is needed to maintain them - in the jargon 'ignition'.

One method is inertial confinement, whereby tiny glass pellets of deuterium and tritium are exploded under laser heating. This is being investigated both under the civil and the military programme because it has defence implications since it could lead to the development of a small thermo-nuclear weapon.

The second is muon catalysis or 'cold fusion'. It is based on the production of a form of hydrogen in which muons rather than electrons orbit the nucleus. This has the effect of pulling the nuclei in molecular hydrogen sufficiently close together for fusion to take place. Such a process will need advances in particle physics before the concept can even be established in principle as a possible energy source. Nevertheless, it might be capable of development via a chain reaction, which was the key to the

release of fission energy. Cold fusion could even become the greatest economic benefit from particle physics!

I do not argue that these processes are viable as alternatives to magnetic confinement but they do demonstrate that at least two other directions now exist for fusion research.

Operating Efficiency and Economic Spin-off

The manning levels at Culham, which houses the JET project, are set out in annex A. Of the 235 professionals employed by JET, over half are on secondment from the UKAEA. The overall balance of manning at the Culham site, with 500 professionals leading to a total employment of 1,730 people is therefore far better than at CERN where 300 scientific professionals generate total employment of 3,000.

Annex B shows how contracts placed by JET have benefited UK industry. This is a secondary argument to the scientific value and the spending efficiency of the programme. However, it is encouraging that some £30m per annum of UK business is generated by JET over and above the funding of salaries and other benefits to UKAEA secondees.

Conclusions and Recommendations

1. To stop the JET project before tritium is introduced would be like discontinuing work on a bridge when it had almost reached the other side of the river. The scientific case for continuing is sound and should be supported.

2. The economics have changed radically since the project was agreed. The decommissioning costs are an order of magnitude higher than originally proposed whereas the economic case for a fusion reactor is weaker. Our

European partners should therefore be pressed to help with decommissioning.

3. Britain should cease to pay any host country premium after 1990.

4. The case for the NET is weak and the possibilities of joint progress with the USA, Europe, Japan and the USSR through ITER should be thoroughly investigated. If the politics could be made to work this would seem a far better way to develop a working thermo-nuclear reactor.

5. The Department of Energy must not get away with any implicit argument that the FBR is going to proceed and with it research funds presently exceeding £100m per annum. In agreeing to the specific proposals to extend JET it would be quite appropriate to ask for a full E(ST) paper setting out the long term economics of FBR and Fusion versus conventional thermal reactors and fossil fuels.

GEORGE GUISE

Annex A
Annex B

Annex A - MANNING LEVELS

Culham Laboratory Manpower Strengths at 31.12.87

		Non-Industrial		Industrial	Totals
		Prof	Non-Prof		
A	Culham	268	315	280	863
B	JET i. UKAEA Staff	131	93	-	224
	ii. Euratom	104	49	-	153
	Sub-Totals	503	457	280	1240
C	Total Contractors on Site: i. Culham		230		
	ii. JET		259		
	Sub-Total		489		489
				GRAND TOTAL	1729

(Contractors include cleaners, tea ladies, taxi-drivers and more general civil, electrical etc contractors).

UNITED KINGDOM
ATOMIC ENERGY AUTHORITY

Authority Fusion Programme Directorate
Culham Laboratory
United Kingdom Atomic Energy Authority
Abingdon
Oxfordshire OX14 3DB

Telephone: Direct line Abingdon (0235) 463432
Switchboard Abingdon (0235) 21840
Telex: 83189
Fax: 0235 463682

From The Authority
Programme Director for Fusion
Dr D.R. Sweetman

Mr P Agrell
Department of Energy
Thames House South
Millbank
LONDON SW1

13 January 1988

Dear Peter

CONTRACTS PLACED BY JET WITH UK INDUSTRY

Following on our recent discussions I thought it might be useful to you to have the up-to-date figures for the flow of income to the UK not normally accounted through Departmental channels.

Up to December 1987 49% of all JET contract expenditure was placed with UK industry, the actual value of the UK component being as follows:

	MECU	£m
Up to December 1983	123	72
Contracts in 1984	26	15
" " 1985	30	18
" " 1986	45	30
" " 1987	43	30
TOTAL TO DECEMBER 1987	267	165

(source JET Annual Reports and JET Contracts Branch for Dec '87 figure, average ECU/£ exchange rates used for the year).

This does not include the income from JET to the UKAEA under the Host Support agreement which is currently running at about £13M per annum. Also the sterling salaries and wages of JET staff is currently £7M per annum, most of which will be spent in the UK, and the European School provides some additional income. The total income from JET to the UK is therefore about £50M per annum.

I hope you find this information useful in your current discussions.

Yours sincerely

D R Sweetman

Copy to W M Lomer
D M Levey

O10

CONFIDENTIAL

C.F. → RA

CC&C.

Prime Minister 2

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

01 211 6402

The Rt Hon Malcolm Rifkind
Secretary of State for Scotland
Dover House
Whitehall
LONDON
SW1A 2AU

23 December 1987

Dear Secretary of State,

See 30.11.87 on pt 11

NATIONAL NUCLEAR CORPORATION (NNC)

I have recently been approached by Lord Weinstock with a tentative proposal to buy the UKAEA's 35% shareholding in NNC. (As you may know, GEC has pre-emption rights over the UKAEA's shares and other entrenched rights over the conduct of the company's business.

I have assured Lord Weinstock that we will keep knowledge of his approach to the smallest possible number of people. Many different organisations have interests in NNC and I have been undertaking a preliminary round of consultations. So far I have spoken to Lord King (who is Chairman of British Nuclear Associates Ltd, the other shareholder in NNC, which is a group of industrial companies with an interest in the construction of nuclear power stations), Sir Frank Gibb (Chairman of NNC), John Collier (Chairman of UKAEA) and Lord Marshall.

I am concious that the South of Scotland Electricity Board (SSEB) is a major customer of NNC and may well have views on a proposal to dispose of the UKAEA's shareholding. I am proposing to have a word with Donald Miller, but before doing so, I wanted you to know of Lord Weinstock's proposal. In particular, I am sure you will want to know of assurances which he has given to me that if GEC acquires control of NNC, it will, subject to the appropriate commercial terms and conditions ensure that NNC meets its obligations with regard to the AGR programme, including the Heysham and Torness nuclear power stations presently under construction. GEC has also undertaken that it would maintain the open purchasing policy of NNC and, in particular, the awards of contracts on merit without any preferential treatment.

I am copying this to the Prime Minister, Nigel Lawson and David Young.

Yours sincerely

Stuart Brand

CECIL PARKINSON

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

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CONFIDENTIAL

10 DOWNING STREET
LONDON SW1A 2AA

From the Private Secretary

18 December 1987

ACOST REPORT: INDUSTRIAL IMPACT ON SIZEWELL 'B'

I have shown the Prime Minister your minute to me of 16 December about the ACOST report on the industrial impact of Sizewell 'B'. She is content to proceed in the way you propose.

DAVID NORGROVE

R. T. J. Wilson, Esq.,
Cabinet Office

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

01 211 6402

David Norgrove Esq
Private Secretary to
The Prime Minister
10 Downing Street
LONDON
SW1A 2AA

17 December 1987

Prime Minister 2

In the light of this information I said I did not think you would want to stop publication.

DRN 18/12.

Dear David,

PUBLICATION OF INFORMATION ABOUT CIVIL PLUTONIUM

You told me that the Prime Minister had asked whether publishing information about individual power stations could provide useful information to, for example, the NUM by giving them data on power station endurance.

In putting the document together, we considered the information carefully with the CEGB to check whether any of it could be used for such purposes and in fact took a decision not to publish information about the amount spent fuel in power station ponds for this reason.

The only information in the document that relates directly to the output of the stations concerned is the thermal output. This information is in any case published separately by the CEGB.

Yours sincerely,

Stuart Brand.

STUART BRAND
Private Secretary

CONFIDENTIAL

CONFIDENTIAL

P 02961

From: R T J Wilson
16 December 1987

MR NORGROVE

ACOST REPORT: INDUSTRIAL IMPACT OF SIZEWELL B

1. Your letter of 26 November asked the Cabinet Office for advice on the handling of this report.

DEPARTMENTAL CONCERNS

2. You will recall that the report accepts the Government's decision on the PWR and for the most part avoids reopening old wounds on thermal reactor policy. Its main themes - the need for steady ordering and for clear responsibilities in the nuclear design and construction industries - are important ones which the Government itself addressed in December 1979 soon after taking office. Many of the arguments in the report are accepted within Government.

3. I have held a further meeting with Departments to go over the ground. It is increasingly clear that the main problem which concerns Departments is one of presentation.

a. Their main concern is that if the report is published as it stands it is likely to be used - or misused - by objectors at the Hinkley Point C Inquiry. To give an example, the report says that difficulties with the Sizewell PWR may only become evident in the commissioning stage. This could well be used as an argument for deferring further PWRs until Sizewell is in operation.

b. The Nuclear Installations Inspectorate (NII) are concerned about the way in which the passages on safety are expressed. Here again they have the Hinkley Point Inquiry very much in mind.

c. On a lesser note, some passages might perhaps be damaging to commercial interests of British industry (eg by implying that their prices for PWR components are not internationally competitive);

d. There has been some suggestion in discussion, not strongly pressed, that a few passages about the organisation of the British design and construction industry might prove awkward in the context of privatisation.

TREASURY SOLICITOR

4. The ACOST Secretariat have also discussed the report with the Treasury Solicitor. I was not present at the Conference where the advice was given but understand that the Treasury Solicitor identified three points of concern:

a. passages which might give rise to an action for defamation;

b. passages which ACOST might claim were fair comment on a matter of public interest but where they might be called upon, if challenged, to produce evidence to support statements in the report; and

c. passages which could cause potential difficulties for future PWR inquiries starting with Hinckley Point C.

EXTENT OF REWRITING

5. The ACOST Secretariat have helpfully prepared the attached text, with changes necessary to meet both the Treasury Solicitor's concerns and those of Departments marked up. There are some three dozen paragraphs which would be affected, but in many cases the changes would be relatively small. This text would meet virtually all the concerns which Departments have expressed. I understand that the Department of Energy plan to put the text to their Secretary of State to see whether he would have any objection to the report being published in this form, although they have not done so yet.

6. The amended text has not yet been seen by either Sir Francis Tombs or Lord Flowers, the Chairman of the Sub-group which produced the report. It is by no means certain that they would be prepared to accept all the amendments. Indeed such indications as there are suggest that Sir Francis regards the text which he submitted on 10 November as the best and final advice of ACOST and would regard any later text in which changes were made for whatever reason as a separate version, specially prepared for publication. There would be obvious risks in having two editions of the report, one prepared for internal consumption, one for the public. It would be much better if the final text of the report could be in a form that was publishable.

NEXT STEPS

7. The ACOST Secretariat would like to go over the ground in detail with Sir Francis Tombs and Lord Flowers to try to persuade them that the report can be made publishable without major damage to its conclusions. It seems to me that they should do this, but only on the basis that any rewriting of the report is a matter for ACOST in the light of the Treasury Solicitor's advice and is not at the request of the Government. It is important that whatever is published - if anything is published - should be accepted by ACOST as their own report and that there should be no suggestion of the Government tampering with the work of an independent advisory body, particularly on a subject as sensitive as nuclear power. If Sir Francis and Lord Flower decided to make changes,

they would then need to show the amended text to the members of the Group which prepared it; the latter have not yet, I understand, seen the report as submitted on 10 November.

8. If Tombs and Flowers decide not to make the report publishable, we shall have to consider the other two options which I mentioned on 2 December: a decision not to publish; or publication without amendment, possibly with a Government reply. But neither is attractive, and it seems sensible for the ACOST Secretariat to go through the arguments with Sir Francis and Lord Flowers to see whether a text which meets Departmental concerns emerges.

9. Subject to any points you may have, I suggest that Mr Fairclough proceeds as he proposes on the basis set out above.

RTJW.

R T J WILSON

ENERGY : policy pt 12

c/pc

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

01 211 6402

D R Norgrove Esq
10 Downing Street
LONDON
SW1A 2AA

14 December 1987

NBPM

Dear David,

FUSION: JET

My Secretary of State has seen your letter of 7 December at top of title as well as the minutes which the Foreign and Commonwealth Secretary and the Chief Secretary sent to the Prime Minister on 4 and 7 December respectively.

Officials here have put in hand the preparation of a paper for E(ST) as the Prime Minister asks. They will aim to circulate a draft to other Departments by Christmas with a view to consultations as early as possible in the New Year, and a meeting of E(ST) towards the end of January. The paper will, of course, address the different issues raised by the Foreign and Commonwealth Secretary and the Chief Secretary.

I am sending copies of this letter to the Private Secretaries of the Chancellor of the Exchequer, Foreign Secretary, and the Education Secretary, as well as to Mr Fairclough and Trevor Woolley in the Cabinet Office.

Yours ever,

Stephen.

S HADDRILL
Principal Private Secretary

ENERGY Policy pt 12



PRIME MINISTER

PUBLICATION OF INFORMATION ON PLUTONIUM

One of the recommendations of the Sizewell B Inquiry Report was that fuller information should be published about plutonium produced in UK civil reactors. In his Decision Letter, my predecessor said that he agreed that this information relating to future plutonium production could be published periodically, bearing in mind considerations of security and commercial sensitivity. I thought you should know how I intend to implement this.

My officials have been discussing with the Generating Boards, BNFL, the AEA and MOD what information could be made available. Considerable information is already made public in answer to PQs. But we have considered afresh what information can reasonably be published in a systematic way, bearing in mind national security concerns. I am pleased to say that it has been possible to extend the amount of information to be made available for 1986-87 onwards. This will be a helpful indication of our encouragement of openness in the nuclear industry, and could help in dealing with any criticisms of continuing secrecy that objectors may raise at the Hinkley Point Inquiry.

Because this information is to be provided only for 1986-87 onwards it does not conflict with our policy of not answering questions on plutonium if they relate to previous Administrations.

I would in any case resist any attempt to provide information for earlier years.

I intend to publish the attached document next Wednesday 16 December

by means of a pursuant PQ and associated Press Notice. It has been cleared with MOD and the other bodies concerned. I would intend to publish such a document annually.

I am copying this minute to the Secretary of State for Defence.

C.P.

Secretary of State for Energy
11th December 1987

DRAFT PRESS NOTICE

CIVIL PLUTONIUM FIGURES PUBLISHED

The Department of Energy has today published figures for 1986/87 on the ~~civil~~ civil plutonium produced at Britain's nuclear power stations, reprocessing activities at Sellafield and civil plutonium stocks.

This is the first time that such detailed information has been published and reflects the Government's encouragement of a policy of openness in the civil nuclear industry.

The figures, to be published annually, have been supplied by the Central Electricity Generating Board, the South of Scotland Electricity Board, British Nuclear Fuels plc and the United Kingdom Atomic Energy Authority.

The information meets in full Recommendation 13(b) of the Sizewell Report which said that "the CEGB, BNFL and the Department of Energy should cooperate to bring about the publication at regular intervals of full and accurate records of the quantity and isotopic content of plutonium produced in UK civil reactors".

In a Parliamentary Answer, Cecil Parkinson, Secretary of State for Energy, said to Graham Riddick MP:

"I have today placed in the Libraries of both Houses copies of a document setting out information concerning the production of plutonium from UK civil reactors during 1986-87".

ACCOUNTANCY DATA ON PLUTONIUM FOR YEAR ENDING 31 MARCH 1987

1. Central Electricity Generating Board/South of Scotland Electricity Board

Reactor discharges and dispatches from site of irradiated fuel

	THERMAL OUTPUT	REACTOR DISCHARGES			DISPATCHES FROM SITE (1)		
	TWh	U tU	Pu kgPu (3)	Pu(F) % (4)	U tU	Pu kgPu (3)	Pu(F) % (4)
CEGB							
BRADWELL	6.6	60	150	75	70	150	75
BERKELEY	4.3	34	100	75	29	100	75
HINKLEY PT.A	14.5	123	350	75	155	400	75
TRAWSFYNYDD	12.5	90	250	75	109	300	75
DUNGENESS A	9.2	68	200	75	140	400	75
SIZEWELL A	8.8	71	200	75	37	100	75
OLDBURY	11.0	97	250	75	174	500	75
WYLFA	21.9	60	150	75	40	100	75
HINKLEY PT.B	18.0	39	150	60	39	150	60
DUNGENESS B	2.4(2)	13	50	85	0	0	-
HARTLEPOOL	0.0(2)	9	0	85	0	0	-
HEYSHAM 1	0.0(2)	13	50	85	0	0	-
TOTAL CEGB	109.2	677	1850		793	2200	
SSEB							
HUNTERSTON A	9.2	73	200	75	100	250	75
HUNTERSTON B	21.6	44	200	60	41	200	60
TOTAL SSEB	30.8	117	400		141	450	
GRAND TOTAL	140.0	794	2250		934	2650	

Notes

(1) Dispatches from site are predominantly to Sellafield but a small proportion go for post irradiation examination (PIE) at Berkeley Nuclear Laboratories and at Winfrith. After PIE the fuel is sent to Sellafield. During 1986/87 the net transfers from PIE were 2tU containing 10kg Pu.

(2) Thermal TWh quoted does not include pre-commercial output.

(3) Rounded to the nearest 50kg Pu. Totals may not add due to rounding.

(4) Percentage fissile plutonium is the sum of the masses of the plutonium 239 and 241 isotopes expressed as a percentage of the sum of the masses of all plutonium isotopes. Percentage rounded to the nearest 5%.

2. British Nuclear Fuels plc

(a) Receipts of irradiated fuel from overseas reactors

- Magnox 89tU
- Light water reactors 159tU

(b) Feed of magnox irradiated fuel to the Sellafield reprocessing plant:-

- CEGB/SSEB fuel 861tU
- from overseas reactors 121tU

There was no feed of AGR or LWR oxide fuel during 1986/87.

(c) 1.8 tonnes Pu of plutonium oxide containing 74% of fissile isotopes of plutonium was produced from CEGB/SSEB reprocessed fuel during 1986/87. 0.5 tonnes Pu belonging to CEGB was transferred to the UKAEA during 1986/87 for use in the civil R&D programme. There were no exports of CEGB/SSEB owned (or origin) plutonium during the year. Less than 0.1 tonnes Pu from the reprocessing of overseas magnox irradiated fuel was exported to France at the customer's request. Apart from gramme quantities of samples, there have been no other imports or exports of extracted plutonium.

(d) Stocks of plutonium held by BNFL at 31 March 1987 under international safeguards were:

UNITS tonnes (rounded to nearest 1/2 tonne)	OWNER				
	CEGB/SSEB		UKAEA	BNFL & OVERSEAS CUSTOMERS	TOTAL
	Magnox	AGR			
(i) Unextracted plutonium in irradiated fuel in storage ponds	1	2 1/2	1/2	13 1/2	17 1/2
(ii) In process of extraction/fuel fabrication or in other intermediate forms (eg nitrate)	1/2	-	2 (1)	-	2 1/2
(iii) In store as plutonium oxide (2)	24 1/2	-	-	1/2	25
TOTAL	26	2 1/2	2 1/2	14 1/2	45

Notes

(1) Includes some of the 5 1/2 tonne of CEGB/SSEB origin plutonium in use for civil R&D purposes.
(2) All plutonium oxide in store contains more than 15% of the Pu 240 isotope.

3. United Kingdom Atomic Energy Authority

(a) Stocks of plutonium held under international safeguards on UKAEA sites at 31 March 1987 amounted to 4.5 tonnes Pu. This includes some of the 5 1/2 tonnes of CEGB/SSEB origin plutonium in use for civil R&D purposes.

(b) Apart from gramme quantities of samples, less than 0.1 tonnes plutonium in total was exported by the UKAEA to Austria, Belgium, France, Italy and the United States and less than 0.1 tonnes plutonium in total was imported from Belgium, France and Switzerland.

DRAFT QUESTION AND ANSWER

To ask the Secretary of State for Energy whether he is now in a position to publish further information on plutonium in line with Recommendation 13(b) of the Sizewell Report.

ANSWER

[Pursuant to the answer given on 30 October to the hon Member for Colne Valley (col 447-448)]

I have today placed in the Libraries of both Houses copies of a document setting out information concerning the production of plutonium from UK civil reactors during 1986-87.

ENERGY: Policy Pt. 12

file Fusion

bc PC

10 DOWNING STREET

LONDON SW1A 2AA

From the Private Secretary

7 December 1987

FUSION: JET

The Prime Minister has seen your Secretary of State's minute of 26 November about the future of JET, and the Chief Secretary's minute of 4 December. The Prime Minister believes it would be useful to discuss this at E(ST) early in the new year, and I should be grateful if the Department of Energy could set in hand the preparation of a paper in consultation with other interested departments and the Chief Scientific Adviser. It would be useful if this paper were also to set out when decisions are likely to be needed not only on the extension of JET but also ITER and NET, together with a brief outline of the issues so that Ministers can have a first discussion of the future of fusion research more generally. This would, among other things, provide a basis for a decision on whether and in what terms ACOST should be consulted on the relative importance of fusion as against other national scientific priorities, as the Foreign Secretary has suggested.

I am copying this letter to the Private Secretaries to the Chancellor, the Foreign Secretary, the Education Secretary, John Fairclough (Chief Scientific Adviser) and to Trevor Woolley (Cabinet Office).

D. R. NORGROVE

Stephen Haddrill, Esq.,
Department of Energy

cc PC

PM/87/069

PRIME MINISTER

JET

WITH DRAWN

1. I have seen Cecil Parkinson's minute to you of 26 November.

2. While I would not disagree with his recommendation that the UK should agree to an extension of the JET project from 1990 to 1992, there are a number of issues involved which need to be looked into more fully before we take any decisions. In particular, the possibility of persuading JET partners to contribute towards decommissioning costs, and the tactics that might be adopted to achieve this, need to be considered carefully in the light of negotiations and developments on other fronts in the Community.

3. Given that the UK has a clear legal obligation to bear the decommissioning costs alone, timing and strategy may be all important in securing a positive response from our partners. A blatant linkage of the JET extension with help for decommissioning would doubtless prove counter-productive, but consideration should be given to whether any more acceptable quid pro quo can be found.

4. It would be helpful in taking these decisions on JET to have a clearer idea of what the UK's longer term strategy on fusion research should be. Cecil has indicated that he would not wish to continue support for fusion research after 1992. Advice from ACOST on the relative importance of fusion, set against other national scientific priorities, would be useful. We shall certainly come under considerable pressure to participate in the stage of research following JET. We shall need to consider, among other matters, whether such a project might not better be on a wider international, rather than just Community basis.

/5...

5. I note than an immediate decision is not required. I suggest therefore that the various issues involved should be considered further through the new inter-departmental machinery. Once further preparatory work has been completed at official level the matter could be referred to E(ST) for decision.

6. I am sending copies of this minute to Cecil Parkinson, Nigel Lawson, Kenneth Baker, and to John Fairclough in the Cabinet Office.

(GEOFFREY HOWE)

Foreign and Commonwealth Office

7 December 1987

KELLOGG POLICY

PT 12

M. Norgrove

CBG

From John W Fairclough FEng
Chief Scientific Adviser

W0315

CONFIDENTIAL

Sir John Bailey KCB
Treasury Solicitor's Dept
Queen Anne's Chambers
28 Broadway
London SW1H 9JS

4 December 1987

Dear Sir John,

ACOST REPORT ON THE INDUSTRIAL IMPACT OF SIZEWELL `B'

You were kind enough to give your advice at a meeting on 18 November on this report. You said you had looked at the report with three concerns in mind, namely defamation, meritorious comment and potential difficulties in relation to forthcoming public inquiries. You ruled out the possibility of a reopening of the Sizewell `B' inquiry. You drew our attention specifically to paragraphs 1.2, 1.4, 1.11, 1.12, 2.2, 2.6 and 2.7 and to the chapter on Safety. We have modified or removed these pargraphs and, having consulted John Rimington, have made modifications to the chapter on Safety.

You said that you did not wish to see a revision of the report, however, since the amendments being proposed will have to be justified to the Chairman of ACOST, Sir Francis Tombs, and possibly other members, I thought it wise to allow you sight of the revisions. The extent of the revisions are greater than those indicated by your advice. These have been made without prejudice to further consideration by Sir Francis Tombs. The matter is now being dealt with at the highest levels and I would welcome your response by close of play on Tuesday 8 December.

Yours sincerely

JOHN W FAIRCLOUGH

Att

Blind copies:

Richard Wilson } without report
David Norgrove }

004/4207

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FROM: CHIEF SECRETARY
DATE: 4th December 1987

PRIME MINISTER

FUSION: JET

Cecil Parkinson sent Nigel Lawson a copy of his minute of 26 November.

2 I agree with Cecil that we should rule out his option (a): the unconditional extension of JET. I have more difficulty in deciding between (b) and (c); I can see the force of Cecil's case for (b); but I wonder whether we yet have sufficient information on the respective costs and benefits to make a final decision. I would therefore welcome an opportunity as I believe has been suggested, to discuss this issue with Cecil and other colleagues concerned. I suggest that it would be helpful if officials could prepare a paper analysing both the options and tactics.

3 In particular I hope that, as well as the costs and benefits of the options, quantified where possible, we can address:

(1) the scope for persuading Oxfordshire to adopt a more realistic attitude;

(2) the other action that might be taken to limit the size of the Community's fusion programme; I recognise of course that Cecil has already made some progress on this point;

(3) the prospects for persuading our partners to contribute to decommissioning costs; I hope that at the least, any extension of JET should be conditional on securing a substantial contribution;

(4) the scope for reducing the host premium that we pay for the period of extension, perhaps as an alternative to (3);

(5) the steps that need to be taken to ensure that the UK does not commit itself, formally or informally, to participation in NET, or other potential successors such as ITER. I share Cecil's doubts about the worth of these projects; experience so far with JET has shown how easily it is to be trapped in collaborative projects of relatively low priority.

4 I am copying this minute to Nigel Lawson, Geoffrey Howe, Cecil Parkinson, Kenneth Baker and John Fairclough.

JOHN MAJOR

CCBG

Qd.0781

CONFIDENTIAL

File ref: ST 112/5/1

MR NORGROVE 3 December 1987

cc Mr Fairclough
Mr Monger

FUSION

FLAP PT II

1 We spoke about the handling of Mr Parkinson's minute to the Prime Minister of 26 November on which you were awaiting responses from other Departments.

2 Mr Fairclough's view, as I mentioned to you, was that the issue ought to be discussed by Ministers and could not satisfactorily be resolved by correspondence, (for example, Mr Ridley, who might be expected to have a direct interest in the matter, had not even been sent a copy of the minute). This view is shared by the Economic Secretariat. Mr Fairclough indicated to the Department of Energy when fusion was discussed at E(ST)O last month that the subject was of sufficient importance to be discussed at E(ST) and that a paper should be prepared setting out clearly when the various decisions - extension of JET, ITER and NET - had to be taken and what the issues were. The minute from Mr Parkinson does not provide a clear picture of the interrelationship between the different decisions. We feel further work at official level is needed before a fuller paper is produced and Mr Fairclough would be happy to take the lead on this, if that were thought appropriate.

VIVIAN BROWN



Kennedy
Policy
PT12

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1. DW to see
2. NBPT.

From: R T J Wilson
2 December 1987

MR NORGROVE

cc Sir Robert Armstrong
Mr Monger

ACOST REPORT: INDUSTRIAL IMPACT OF SIZEWELL DECISION

1. I promised to let you have an interim reply to your request for advice on the possible rewriting of parts of this report.

Need for rewriting

2. As agreed, I have held a meeting of those most closely concerned: Mr Fairclough, the ACOST secretariat, the Chief Nuclear Inspector and representatives from the Departments of Energy and Trade and Industry.

3. In many ways the report is better than it might have been, given Sir Francis Tombs's opposition to the PWR and Lord Flowers' stance on environmental aspects of nuclear power. It accepts the Government's decision on the PWR and for the most part avoids reopening old wounds on thermal reactor policy. Its main themes - the need for steady ordering and for clear responsibilities in the nuclear design and construction industry - are important ones which the Government itself addressed in a statement in December 1979, soon after taking office.

4. But, as the Energy Secretary has pointed out, the report as drafted contains a number of passages which could cause difficulty. A few of the changes which departments wish to make relate to minor factual points and can readily be put right. A few more relate to passages which the Treasury Solicitor has advised should be modified, and I understand Sir Francis Tombs is likely to accept them. But the majority fall broadly under the following headings:

a. there is concern that a number of passages might cause damage to the commercial interests of British industry, eg by implying that they could not build a safe pressure vessel, or that their prices for PWR components might not be internationally competitive;

b. there is a short chapter on safety which the Nuclear Installations Inspectorate want substantially redrafted because it deals with two difficult issues which will be important at the next PWR inquiry (Hinkley Point). The issues are first, how far cost benefit analysis can be applied to safety assessment criteria; and second, how far a more prescriptive approach by the NII could be introduced into safety assessment, and whether it is an essential prerequisite of privatisation;

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c. more generally there is concern that some passages could be used - or misused - by objectors at the Hinkley Point Inquiry: for instance the statement that difficulties with the Sizewell PWR may only become evident in the commissioning phase;

d. the report's discussion of the organisation of the design and construction industry may also prove awkward in the context of privatisation.

HANDLING

5. There are three ways we could handle the report.

6. One option is not to publish it. But the existence of the report is almost certain to become known and it would provide an obvious target for critics of the nuclear programme, for instance at the Hinkley Point Inquiry. It would be more damaging to have the report forced into publication than to publish it quietly now.

7. The second option would be to publish it now without amendment, possibly with an immediate Government reply. The difficulty with this course is that statements in the report would still be on record from an authoritative source of advice to the Government; and they could still be quoted to the detriment of British industry and at the Hinkley inquiry.

8. The third option is to try to get the authors of the report to agree to as many as possible of the offending passages being changed. In many - although not all - cases the problem can be overcome by relatively simple drafting.

PRESENT POSITION

9. The third option seems the least unattractive, and we are exploring it with the ACOST Secretariat and departments. It is however far from clear that we will be able to get all the changes made that Departments want. There is also the problem of how any changes which are made would be justified. Commercial sensitivity would cover some, but no means all of them. For the rest I suggest that we would simply have to say that departments had offered comments (which I understand is not unprecedented) and that it had been a matter for ACOST to decide what should finally go in the report. It is relevant that the text submitted to the Prime Minister has not been seen by most members of ACOST or of Lord Flowers' study group; so the number of people who can compare texts may be relatively limited.

10. I will report further to you when we have a clearer idea of what progress can be made on the points in the previous paragraph.

RJW.

R T J WILSON

ENERGY: Policy PT11.



Mr Norgrove.
Mr spoke. I too think that a meeting of E(ST) in January, before discussions start, would be a good idea. AJT 1/12

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Reference No E 0455

MR V BROWN

PPA please.

cc Mr Wilson
Dr Walker

NBPM.

Fusion

I asked Mr Williams of the Treasury about their likely reaction to the Energy Secretary's minute of 26 November.

2. He said that although they would really like to go for option (c) they would probably accept that this was not practical, and so would broadly support (b). They are opposed to participation in NET or ITER, and will argue that we must ensure that we are not sucked into them.

3. None of this seems inconsistent with your speaking to Mr Norgrove, as you suggested, to propose an E(ST) discussion next month. I would favour this. It would also give time for further official discussions if they are necessary. I also mentioned the possibility to Mr Williams, who seemed responsive, and suggested that he might consider inserting a reference in the Chief Secretary's minute.

4. Mr Parkinson says that he has asked his officials to work up a case, and to open discussions with the Commission 'as early as possible next year'. We would have to make sure that these discussions did not start before the E(ST) meeting - a point worth mentioning to Mr Norgrove.

G W MONGER

Economic Secretariat
1 December 1987

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ENERGY

POLICY

PT II

PART 11. ends:-

SS/ENERGY TO CH. EXCH. 30.11.87

PART 12 begins:-

Q. MONGEK TO V. BROWN. 1.12.87.


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