British Energy

"REPLACE NUCLEAR WITH NUCLEAR"

British Energy's Submission to the Government's Review of UK Energy Policy

Nuclear power is the only large scale generation option that does not contribute to global warming whilst delivering security of energy supply

The UK should continue to source around 25% of its electricity from nuclear… to "replace nuclear with nuclear"

The market on its own will not achieve security, environment and economic objectives. Government needs to set the framework

If government addresses a number of key issues, new nuclear can be delivered in the UK by the private sector

British Energy is positive about participating in any UK replacement new build programme

British Energy

Passionate about Tomorrow, Today

CHAPTER 1 THE NEED TO ACT

"To knowingly cause large scale disruptions to climate would be unjust and reckless. We stand on the threshold of doing just that. If the United Kingdom cannot demonstrate that it is serious about doing its part to address this threat, it cannot expect other nations – least of all those which are much less wealthy - to do theirs".

Royal Commission on Environmental Pollution, 2000

The challenge of global warming

1. There is scientific consensus that global warming is one of today's most pressing issues. The costs associated with mitigation are high but significantly less than the damage that will otherwise result. The need to act is urgent.

2. The UK is currently on track to meet its Kyoto commitments of a 12.5% reduction on 1990 emissions of greenhouse gases by 2008-12. This is largely due to reduced coal-fired generation in the last decade resulting from "the dash for gas" combined with increased nuclear output. Clearly, this is welcome but it is a consequence of good fortune rather than good policy.

3. The contribution made by nuclear power to this achievement is extremely significant. Almost 80 TWh or a quarter of the UK's electricity in 2000/01 was generated by nuclear power. Had this electricity been generated with the current mix of fossil fuels, then the UK's emissions would have been increased by 50 million tonnes of CO_2, 175,000 tonnes of SOx and 80,000 tonnes of NOx.

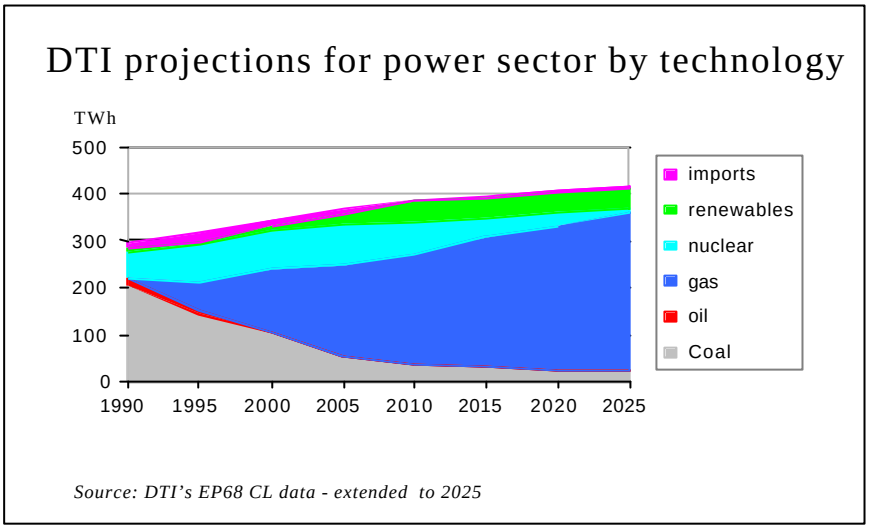
4. To put this in context, ***the carbon emissions avoided through nuclear power are equivalent to the emissions from almost half the vehicles on UK roads.***

5. However, over the next 25 years, it is planned that all the BNFL and British Energy nuclear plants (bar Sizewell B) will close. Nuclear power is the only large-scale generation option that does not emit greenhouse gases. Accordingly, on current trends, as nuclear plants close, the UK's greenhouse gas emissions will rise.

6. Unless there is effective government action, further new gas fired plants will replace today's emission-free nuclear, seriously damaging the UK's chances of continuing to meet its Kyoto target.

Security and diversity of energy supply

7. Security of energy supply is vital to the stability of any economy; this requires robustness to import dependency, price stability and fuel diversity. A snapshot today of the UK electricity sector shows a healthy picture; coal, gas and nuclear all making major contributions and a small but emerging renewables component adding to emissions-free diversity.



8. However the reality is that the UK continues to be in "dash for gas" mode. As the figure above shows, the DTI predict that gas will provide over 70% of the UK's electricity by 2020.

9. Furthermore, from 2025 onwards it is forecast that 90% of the UK's imported gas will be from Russia, the Maghreb or the Middle East. With the UK at the end of a long supply chain traversing areas of potential political instability, there will be serious risks to supply security and price stability.

10. Similar concerns caused the European Commission to publish its green paper on security of supply last year stressing the need to examine the nuclear option and the contribution this can make to security of supply and greenhouse gas emission reductions.

11. Security also lies behind the recent US National Energy Policy recommendations supporting the expansion of nuclear and Finland's proposal to build a fifth reactor rather than increase dependency on Russian gas.

Nuclear power delivers security of supply

12. Nuclear generation contributes to the security and diversity of UK energy supply in various ways as illustrated below.

A reliable large scale power source	Nuclear supplies a quarter of the UK's electricity.
Security of fuel supplies	Uranium is plentiful and available from many politically stable sources. Its price is not tied to oil and gas sector trends.
Long term price stability	Nuclear costs are largely fixed over life. Fuel costs represent a small proportion compared with fossil plants.
Counterbalance to gas	Baseload nuclear is the only environmentally acceptable counterbalance to the potential dominance of gas.
Nuclear creates space for coal	By balancing coal's significant carbon emissions, nuclear could allow coal to be retained as a component of the energy mix and thereby enhance diversity.

13. It is British Energy's recommendation to the Energy Policy review that for crucial policy reasons, the UK should continue to source around 25% of its electricity needs through nuclear power.

Key Points

- **Scientific opinion is that global warming is real and urgent.**
- **Nuclear generation is the only large scale generation option that does not emit greenhouse gases.**
- **The present UK nuclear stations avoid the equivalent of the carbon emissions from around half the UK's vehicles.**
- **Nuclear power can be relied on to deliver security and diversity.**
- **The combination of environmental and strategic benefits make nuclear power the key to achieving a balanced energy mix.**
- **The UK should continue to source around 25% of its electricity needs from nuclear power.**

CHAPTER 2 STRIKING THE RIGHT BALANCE

"However, it is difficult to see how the European Union can in future meet the challenges of climate change and ensuring energy supply at reasonable prices without nuclear power continuing to make at least its current contribution to electricity production".

European Economic & Social Committee Report, 2001

A framework for UK energy policy

14. The UK requires an energy framework that balances security, diversity and care of the environment with price stability and competitiveness. An indicative ranking of some of the relevant issues is given below.

Attribute	Coal	Gas	Renewables	Nuclear
Carbon free	X	X	✓	✓
Large scale	✓	✓	X	✓
Security of supply	✓	X	X	✓
New capacity cost	X	✓	X	X

15. Each fuel type has benefits and drawbacks

(i) **Coal** can be sourced indigenously or on a competitive international market. Of all fuels, it emits most global warming gases. However because nuclear is carbon free, a mix of nuclear and coal taken together will have a global warming characteristic similar to gas.

(ii) **Gas** emits 50% less CO_2 than coal but there are security of supply concerns. Replacing nuclear with gas would reverse the emissions reductions achieved over the past few years.

(iii) **Renewables** are mainly carbon-free but cannot be relied upon due to their intermittent availability and limited scale. Most rely on economic support and give rise to extensive land use or planning resistance.

(iv) **Nuclear** provides the only large-scale source of carbon-free generation. It is capital intensive and requires long term investment. As with renewables, new nuclear may be controversial and attract a degree of public opposition.

The role of government in energy policy

16. Government requires an energy policy that impacts upon a wide spectrum of priorities. Policies may conflict and only government can manage the trade offs to optimise the outcome. The market, left to itself, cannot be relied upon to do so.

17. In recent years, government has targeted lowering prices to consumers by maximising competition. However, unconstrained competition will not deliver anything other than short-term cost minimisation leaving the economy vulnerable to shocks.

18. In addition, the government has made *ad hoc* interventions to encourage renewables (environmental policy) and coal (social policy) but without recognising the importance of security of supply.

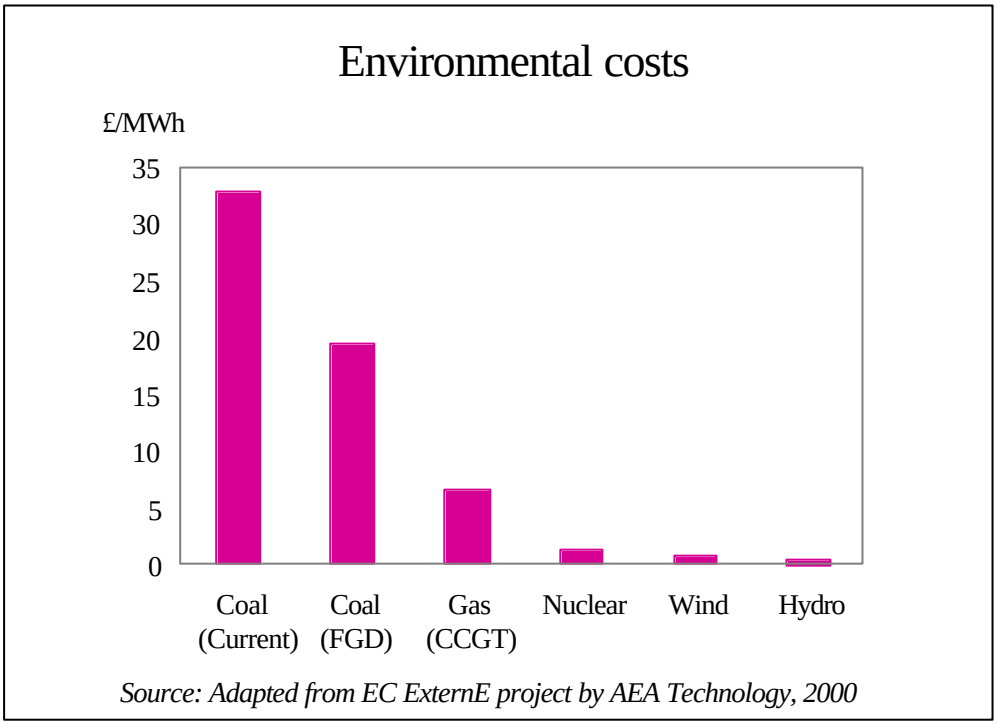
19. The Climate Change Levy, an energy tax, was introduced on environmental grounds but still taxes nuclear power, the largest source of carbon-free generation. Furthermore, the UK's emissions trading proposals, which correctly focus on carbon reduction, also exclude nuclear power.

20. California illustrated the consequences of poor policies when inappropriate regulation created a lack of incentive to invest that, combined a predictable growth in demand, resulted in massive disruption.

21. Energy at long term sustainable prices is preferable to short term price reduction but with the risk of price volatility and supply interruption in the future.

Comparative environmental costs

22. All electricity sources impact the environment, some more than others. To assist in ranking the environmental impact, the EU's ExternE Project has developed a methodology for comparing the environmental costs of power generation options. The results are summarised in the figure below.



Source: Adapted from EC ExternE project by AEA Technology, 2000

23. The above shows;

(i) the environment damage (expressed in money terms) from gas fired power generation is significantly lower than for coal; however nuclear, along with wind and hydro, is significantly lower than gas.

(ii) Coal with Flue Gas Desulpherisation has a significantly smaller impact on the environment than coal without. In order to achieve this, the owners have to meet both the cost of installing the FGD equipment and also the considerable additional operational costs.

(iii) In a similar way, the owners of nuclear plant have to install extensive waste management facilities and pay for the overlife collection, treatment and ultimate disposal of the various waste streams. The remaining cost to the environment is therefore small and not dissimilar to wind and hydro.

What a balanced energy mix might look like

24. What could constitute the characteristics of a balanced energy policy are suggested below.

Characteristics of a balanced energy policy

Security of supply

- No fuel source exceeds 40% of the total mix.
- At least 50% fuel from indigenous or reliable sources.
- Retain coal capacity.

Environmental

- 50% from carbon free generation sources (renewables, hydro, nuclear).

Economic

- Retain competition and benefits of electricity market.
- Use the market to find least cost solution.
- Affordable energy prices.

25. A mix of around 15% coal, 40% gas, 20% renewables and 25% nuclear by 2025 could deliver the right balance between these objectives. This would achieve a 40% emissions reduction on 1990 levels.

26. Electricity generation is capital intensive and requires long life assets. Decisions taken now will determine the energy mix not just in 2025, but the second half of this century. A new nuclear station will take around 10 years to plan/license/construct and typically have a life of at least 60 years thereafter. A CCGT station may last for 30 years and then be replanted. The investments made now must be capable of delivering both medium term objectives and the stringent targets that are likely to apply in 2050.

27. In general the best solutions are found through competition, selective government intervention and consistent regulation. The challenge in creating an energy policy is to retain these attributes whilst achieving the necessary strategic objectives.

Key Points

- **Without an energy policy, nuclear will decline and gas will dominate.**
- **Nuclear power delivers stable baseload needs and protects against gas price volatility.**
- **The market on its own will not achieve security, environmental and economic objectives. Government must set the framework.**
- **The policy should target a mix of 15% coal, 40% gas, 20% renewables and 25% nuclear by 2025.**
- **Decisions need to be taken now because of the long lead times of power generation assets.**

CHAPTER 3 REPLACE NUCLEAR WITH NUCLEAR

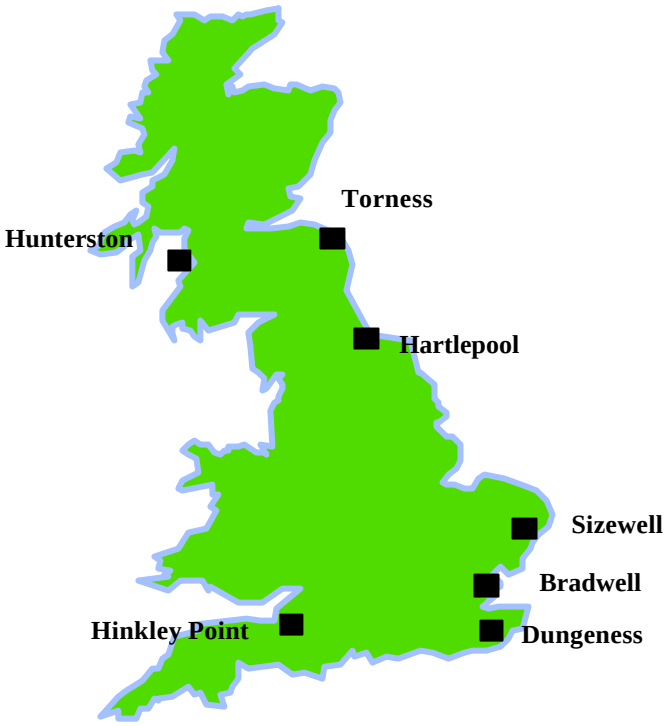
"We endorse the 1998 recommendations of the House of Commons Trade and Industry Committee that 'A formal assumption be made now, for the purpose of long term planning, that new nuclear plant may be required in the course of the next two decades'….. that the timetable for such considerations should allow a decision to be taken early enough to enable nuclear to play its full, long term role in national energy policy."

Joint Working Group of the Royal Society and the Royal Academy of Engineering

Setting the scene

28. For the UK to continue generating 25% of its electricity from nuclear will require the construction of replacement nuclear capacity ready to operate when today's plants retire. A policy of ***"replace nuclear with nuclear"*** is proposed.

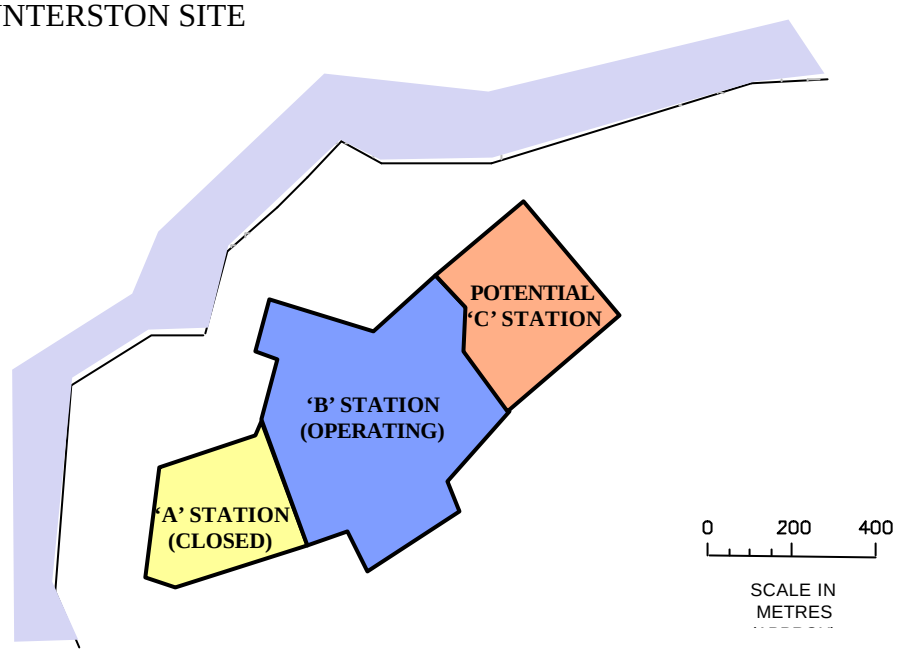
29. Across the UK there is a range of suitable sites adjacent to existing nuclear facilities owned by British Energy and BNFL. The map below shows potential sites owned by British Energy.



30. Retaining a 25% nuclear component in the generation mix will require the construction of around ten new nuclear power stations each with a capacity of 1000-1200 MW for commissioning between 2010 and 2025.

31. For example, a new nuclear power station, such as Hunterston C, could be built adjacent to the existing plants on land already owned by British Energy. The objective would be to commission the new plant when the existing operating plant is planned to cease generation in 2011.

HUNTERSTON SITE



32. The benefits of this approach are that the new station would connect into the grid through the existing transmission lines and reuse much of the present infrastructure. Most importantly, it would provide continuity of employment for a highly skilled workforce and build on the good relationships with the supportive local communities.

The world perspective

33. In Europe, nuclear is the single largest source of electricity generation and accounts for 35% of electricity supplied. Internationally, contrary to some perceptions, the use of nuclear power is still growing and new plant continues to be ordered and constructed, principally in Asia.

34. Key world-wide data on nuclear power is set out in the table below.

World-wide nuclear	438 reactors in operation. 16% of the world's electricity demand. 352,600 MW installed capacity[1]
Generation in 2000 compared with 1999	Generation of 2,560 TWh in 2000[2], up 3% from 1999.
Reactors commissioned	24 reactors, some 12,000 MW, commissioned over last 5 years[3]
Reactors under construction	36 reactors under construction amounting to some 30,300 MW[1]
Sources: 1. WNA (Sept 2001). 2. US DOE energy information administration/monthly energy review (Aug 2001). 3. IAEA (data as of Dec 2000)	

Reactor design improvements

35. In the late 1980s and 1990s, several nuclear plant suppliers began work on new reactor design types. These incorporated advanced features that provide enhanced safety arrangements while reducing construction and operating costs. Major advances have been made based on simplified modular designs, increased factory fabrication content, much shorter construction times and substantially reduced construction and operating costs.

36. British Energy's view is that the Westinghouse AP 1000 and CANDU NG 600 designs, amongst others, could be delivered in time to form the basis of the "replace nuclear with nuclear" new build programme.

The commercial challenge

37. The range of levellised lifetime costs of a new build project, expressed as the price of electricity required over the investment appraisal period, is illustrated in the table below. This assumes achieving an 11% nominal rate of return over a 20 year investment appraisal period.

38. Also shown is today's UK, post NETA market price range and the current price gap that needs to be met to make new nuclear plant economic when measured against these electricity prices.

Item	Lifetime levellised cost	Today's post-NETA baseload market price	Economic gap
New plant base case	£25 – 30/MWh	£18 – 20/MWh	£5 – 12/MWh

39. Although a significant economic gap exists, it would be cheaper to close the gap for nuclear than for any other carbon-free new generation types such as renewables. This issue is addressed further in the next chapter.

40. The lifetime levellised cost in the table above does not include the one-off "first of a kind" costs for a new plant. These development costs, estimated to be around £300m, cover the investment needed to bring a new design to fruition including detailed design, manufacturing infrastructure, generic licensing costs and adaptation to the UK. This development programme could well take five years and is on the critical path for achieving the "replace nuclear with nuclear" strategy.

41. There are several policy issues to be resolved associated with a new build programme including;

(i) How are the first of a kind costs going to be financed? The private sector will need strong reassurances from government that it intends to proceed with a new build programme so that these costs can be recovered.

(ii) Should the UK have more than one design to give diversity and ensure competition between vendors?

(iii) What should be the structure of the nuclear industry?

(iv) How should the economic gap be closed?

Key Points

- **By 2023 all the UK's current nuclear plants will have closed bar Sizewell**
- **British Energy proposes a strategy of "replace nuclear with nuclear."**
- **This will require commissioning around ten power stations each of 1000 – 1200MW capacity between 2010 and 2025.**
- **There have been considerable advances in the design of new nuclear plants over recent years.**
- **At least two of these new designs, the AP 1000 and the CANDU NG, could be developed in time to meet the above programme; however the development and generic licensing programme could take five years and needs to start soon.**
- **Compared to currently operating plants, these new designs will be cheaper and quicker to build.**
- **Current post-NETA price levels are £18 – 20/MWh. The electricity selling price required to make these new designs viable is estimated to be £25 – 30/MWh. Means need to be found to bridge this "economic gap."**

CHAPTER 4 ENABLING NEW BUILD

"Nuclear energy offers the only realistic prospect for significant quantities of emission free power generation for the long term and its safe development must be openly encouraged by government"

Major Energy Users Council Submission to PIU

Introduction

42. There are two challenges to be addressed. The first is that at today's market price for electricity, new nuclear build is uneconomic; what can be done to address this? The second are the issues associated with financing and constructing 10 GW of new nuclear capacity costing some £10billion over a period of around 20 years.

Closing the price gap

43. The table below sets out estimated new entry price of various fuel types.

	New entry price[1]
Nuclear	£25 – 30[2]/MWh
Gas combined cycle	£20 – 25[3]/MWh
New Coal	£25 – 36[3]/MWh
Renewables	£22.5 – 39[3]/MWh
Current post-NETA electricity price	**£18 – 20/MWh**

1. New entry price is equivalent to levellised lifetime cost
2. Source: British Energy, based on 11% rate of return over 20 years
3. Source: DTI Initial Submission to the PIU Energy Policy Review

44. This comparison illustrates the significant price advantage of a CCGT over new coal, renewables and nuclear. At current market prices no new generation projects (other than government-supported renewables) are economic. As baseload electricity prices rise, only new CCGTs are likely to be considered at least for a number of years.

45. For a nuclear new build programme to be commercially viable, there would need to be a long-term premium recognising nuclear's environmental and other benefits. The government could achieve this by one or more of the following:

Carbon free obligation	An extension of the existing Renewables Obligation (see below)
Climate change levy	Exempting nuclear from the climate change levy
Emissions trading	Use of tradeable permits to price CO_2 emissions
Carbon tax	A tax on carbon-emitting generation
Regulated rate of return	Nuclear generators recover allowable costs and receive a regulated rate of return on capital

46. Investors in new nuclear build would need to be confident the arrangements would remain in place over the life of the project.

Extending the Renewables Obligation Scheme

47. As part of its programme to combat climate change, the government has already addressed the financial roadblocks to new renewables through the Renewables Obligation Scheme. This has been designed to make up the difference between the market price of electricity and the price required by investors to make an otherwise uneconomic investment decision within the current market framework.

The Renewables Obligation Scheme

- This places an obligation on all licensed electricity suppliers in England & Wales to purchase a specified percentage of their sales from eligible renewable generators. This applies to 3% of sales up to March 2003 rising to 10% of sales in the year ending March 2011.
- The obligation lasts 25 years.
- Under the scheme a Renewables Obligation Certificate is issued to accredited generators for each MWh of eligible renewable electricity generated.
- Suppliers can accumulate certificates by purchasing output from eligible sources or by purchasing the certificates alone.
- As an alternative to purchasing renewable energy, suppliers may fulfil part or all of their obligation by paying a buy-out price of £30/MWh to Ofgem.
- Investors in renewables receive income from the following sources:
  - the prevailing market price of electricity;
  - *plus* up to £30/MWh through their contracts with suppliers;
  - *plus* receiving a share of buy-out payments from non-compliant suppliers.

48. British Energy proposes that a "Carbon-free Obligation Scheme" should be introduced modelled on the Renewables Obligation Scheme arrangements. This would apply to the "replace nuclear with nuclear" programme and cover the 25% of the UK's electricity needs to be met by nuclear generation.

49. For illustrative purpose, a premium of £10/MWh over market has been assumed to be sufficient on this basis, as the table below illustrates, delivering nuclear via this scheme would cost significantly less than the equivalent quantity of renewables.

	Nuclear	Renewables
Obligation price	£10/MWh[1]	£30/MWh[2]
Annual cost of maintaining 10% of supply (34 TWh)	£340m	£1.0 billion[3]

Assumptions:
1. Based on £10/MWh buy-out penalty i.e. required premium over illustrative market price of £20/MWh.
2. Renewables Obligation buy-out penalty.
3. DTI Renewables Obligation consultation document.

Overcoming investment barriers

50. Even if the economics of a new nuclear station were the same as a new CCGT, investors would still have concerns over a number of issues. For example, this would be the first new nuclear power plant construction for over ten years whereas CCGT plant new build is now routine. There is also the large upfront cost of nuclear compared with CCGT and the longer construction timescale, the difference being about a factor of three greater for both.

51. A number of specifically nuclear issues are discussed below and solutions proposed, some of which would require government action.

Planning approval and consents

52. A new streamlined consents process will be necessary if private sector investment is to be encouraged. It will be important to have certainty in the planning process. The delayed start-up of the BNFL MOX plant is a clear example of an arrangement that will deter future private sector investors.

53. Clearly an operational licence can only be issued once the commissioning tests for any new plant have been completed and compliance with the safety case demonstrated. However the requirements for issuing the licence need to be fixed at the start of the project.

54. The Better Regulation Task Force recently highlighted principles of better regulation. Key are transparency, accountability, proportionality, consistency and targeted regulation. Consistency is particularly crucial between different regulators (economic, environmental and safety) and between regulators and government policy.

55. In particular the current proposals from Ofgem to reallocate transmission access and losses will penalise all generators north of the Trent for little UK-wide cost benefit. This type of retrospective adjustment to the economic basis of a long-term infrastructure industry is damaging to investor confidence.

56. In a decade the market framework has changed twice. Consistent and stable regulation is important for long-term investment.

Construction

57. All of the UK's current nuclear plant was constructed under government ownership. This was made possible because CEGB and SSEB had a captive customer base and there was an obligation to supply.

58. Although there were attempts to contract for station construction on a turnkey basis, they had only limited success. However the reality was that CEGB/SSEB were ultimately able to pass on the cost-overruns and construction risks to their consumers via their tariff structures.

59. The 10GW, 10-station "replace nuclear with nuclear" proposal faces a different commercial, private sector world. The developers of the new nuclear plants will adopt a highly risk averse contractual approach and investors will be nervous of a capital investment programme on this scale.

60. The designs suggested as the potential front-runners are the Westinghouse AP 1000 and the AECL CANDU NG. Westinghouse is owned by BNFL, which is UK Government owned, and AECL by the Canadian Government. It may well be that the best way to achieve a risk/reward relationship that will be acceptable to both the plant purchaser and the architect engineer constructor will be some form of Public Private Partnership.

61. In any event, a private sector disciplined project management approach will be essential.

62. The new build programme provides an opportunity to standardise nuclear power station design in the UK. If there is to be a 10-station programme, then there is a compelling argument for identical plants using a single set of safety, quality and nuclear operational documents. New construction must build on the operational experience acquired over the years through the World Association of Nuclear Operators and the Institute of Nuclear Power Operators.

Public acceptability

63. In recent years' UK nuclear energy companies have been open about their operations and their activities; however, there is considerable scope for greater transparency in the future. New methods of sharing information are now available and the use of the government's web site to make Energy Policy Review submissions public is commendable.

64. The role that nuclear power plays in protecting the environment is still not generally appreciated. The challenge to the nuclear industry and policy makers is to bring about a better understanding of nuclear's benefits in the context of the wider picture. Excellence in the performance of the nuclear plants operating today, not only in the UK but also in the world at large, will be key to bringing that about.

65. In the run-up to the privatisation of British Energy, the issues associated with nuclear power were well publicised leading to a successful flotation. The policy of open and honest communications must continue and it will be crucial for the industry to be proactive in helping people understand the role of nuclear and the benefits it brings to society.

66. It is noticeable that the recent Californian experience has caused a significant favourable shift in the public attitude towards nuclear power. The public debate needs to make clear there are few practical options and no easy answers.

Dealing with waste

67. Much of the public focus on nuclear power is on waste management and the ongoing uncertainty over government's policy on the disposal of high-level waste is damaging. Whether the answer is to be long-term surface storage or a deep underground repository, clarity of policy is required.

68. Technically both solutions are feasible; the issues are political rather than practical engineering. This issue must be resolved in the forthcoming review of nuclear waste policy.

69. International waste management experience is helpful. Finland has had an underground intermediate level waste repository in full operation for several years and has recently approved the construction of a spent fuel repository. Issues that seem insuperable in the UK have been dealt with there in a pragmatic and common sense way.

70. To put the new build issue in context, the waste from 60 years operation of the "replace nuclear with nuclear" programme would create less than a 10% increase in total high-level waste volumes in the UK. In principle this can be dealt with along with existing waste arisings.

Spent fuel contracts

71. British Energy's present arrangements for dealing with its AGR spent fuel are long term contracts with BNFL based on reprocessing.

72. The practice in the US (including British Energy's plants there) is quite different;

(i) The utility has title to, and is responsible for, the spent fuel when it is still on the utility's licensed site.

(ii) The utility pays the US Department of Energy (DoE) a fixed price of $1 for each MWh of electricity generated. In return, once the spent fuel leaves the site, ownership transfers to the DoE who are then responsible for ultimate storage in the US national repository.

73. The price difference between the US direct disposal arrangements and those in the UK are considerable. In the US, the pay-as-you-go service provided by government costs $1/MWh (£0.70/MWh). In the UK, British Energy has to pay BNFL and other government organisations some six times this amount.

74. This enormous price differential explains in large measure why there is a "renaissance" of nuclear power in the US and the marginal profitability of British Energy's nuclear business in the UK. The "replace nuclear with nuclear" programme has to be based on the US $1/MWh approach.

Financing new build

75. The 10-station programme would require some £10bn investment in the period up to 2025, i.e. an average of some £500m per year. It would comprise around ten separate projects with the earliest stations complete and generating income before the later ones are started.

76. Provided the issues addressed above are dealt with, there should be sufficient capacity and appetite in the bank and capital markets to enable between 50% and 80% to be funded by debt. This will be a sum of up to £400m per year.

77. The most difficult funding period will be during construction due to the risks of time and cost overruns and commissioning delays. Vendor finance may be available backed with some degree of government underwriting.

78. The amount of equity funding required would be up to £250m per year depending on the level of debt achieved. British Energy believes that it would be in a position to provide this level of funding from its own cashflows thus enabling the programme to be wholly financed by the private sector. This assume that the structural changes to British Energy's existing UK nuclear business outlined in the next chapter are implemented.

Key Points

- **New nuclear (like new coal and renewables) is uneconomic against gas fired combined cycle plant in the present and foreseeable UK market.**
- **For new nuclear to be commercially viable, there would need to be a long term premium to recognise nuclear's environmental and other benefits. Mechanisms such as the Renewables Obligation Scheme already exist to incentivise environmentally sound investment.**
- **British Energy proposes that a Carbon-free Obligation Scheme, modelled on the Renewables Obligation Scheme, is introduced to deliver 25% of the UK's electricity needs from nuclear.**
- **A nuclear project will not be financeable unless the following are also addressed: construction risks, public acceptability, nuclear waste policy and spent fuel management contracts. The licensing process needs to be based on principles agreed at the start of the project.**
- **A replacement nuclear programme could be financed by the private sector provided necessary enabling actions are taken by government.**

CHAPTER 5 THE FUTURE OF UK NUCLEAR

"Time present and time past
Are both present in time future
And time future contained in time past."

T S Eliot, Four Quartets

Introduction

79. British Energy is positive about participation in any UK replacement new nuclear build programme.

British Energy's international experience

80. British Energy is the world's largest, private sector investor in nuclear plant with 26 reactors in three countries. This covers four reactor types; AGR, CANDU, PWR and BWR as illustrated below.

Country	Number of reactors	Ownership
UK	14 AGRs 1 PWR	100% BE
Canada	8 CANDUs	80% BE 15% Cameco 5% Unions
USA	2 BWRs 1 PWR	50% BE 50% Exelon

British Energy in the UK

81. In the UK, British Energy is the only private sector nuclear generator and has extensive UK electricity market knowledge and experience. In the five years since privatisation, British Energy has reduced cost per unit by 20%; improved productivity per employee by 60% and seen a year on year safety improvement.

82. Despite this, and due to a massive fall in generation prices in 2000/01, British Energy's profitability has fallen sharply. Between 1999/00 and 2000/01, the company's profit before tax fell by £230m resulting in the UK's largest generator with a £1.9 billion turnover achieving a profit before tax of only £10m. Indeed, without the contribution from its overseas business, the company would have made a loss.

83. The commercial performance of British Energy's nuclear plants in the UK will be seen as an economic barometer for how nuclear assets fare in a competitive, deregulated market.

84. If UK electricity prices were to stay at the current level, British Energy's UK business would remain at around breakeven even taking into account the ongoing programme of further cost reduction and output improvements. Although there is a widely held view that in the longer term, electricity prices will rise towards gas new entry costs, the anticipation of this could not provide the basis for financing a new build programme.

Issues to be addressed

85. British Energy proposes that the uncompetitive nature of the spent fuel arrangements transferred at privatisation, particularly the contracts with BNFL, must be changed to the pay-as-you-go $1/MWh model that is the practice in the USA and Canada. This should have been put in place in 1996 when British Energy was privatised.

86. The government should negotiate, therefore, with British Energy the removal of the historic spent fuel and waste liabilities inherited by British Energy at privatisation. These pre-1996 "historic" liabilities relate to electricity generated when the nuclear plants were under government ownership.

87. The arrangements proposed above would reduce the company's annual spent fuel costs from some £300m at present to around £50m. This would create sufficient cash flow to enable British Energy to participate as the leading equity provider for a new build programme.

Restructuring UK nuclear

88. The UK's legacy nuclear liabilities are spread among a range of public and private sector entities with some of them sharing the same sites and making an efficient approach to their discharge difficult.

89. The creation of a UK Nuclear Liabilities Agency to deal with the long-term civil and military nuclear liabilities legacy could address this more effectively. At the same time, the privatisable businesses of BNFL should be moved into the private sector as soon as practicable.

90. Creating a "renaissance" of nuclear power in the UK would bring considerable employment and other economic benefits.

Key Points

- **Since privatisation, British Energy has made major business improvements. The company's private sector experience will be essential to the success of the proposed "replace nuclear with nuclear" programme.**
- **The collapse of electricity prices in 2000/01 has resulted in the Company's UK nuclear business becoming loss-making.**
- **Restoring UK profitability will be a pre-requisite to British Energy playing a major role in any future new build programme.**
- **British Energy recommends that the present BNFL spent fuel contracts are replaced by the US pay-as-you-go arrangements.**
- **British Energy also propose that the pre-1996 historic liabilities for spent fuel and related services should be transferred to the proposed UK Liabilities Management Agency.**
- **A "renaissance" of nuclear in the UK would bring considerable employment and other economic benefits.**