

# Managing Spent Fuel at Sizewell B

## Feedback on Public Exhibitions & Community Meetings

## Background to this project

At Sizewell B used or spent fuel is currently stored on site pending reprocessing or final disposal. The current storage facility for the spent fuel will as anticipated reach capacity by 2015 and so British Energy, part of EDF Energy, is reviewing the options for managing the spent fuel after that date. Managing spent fuel is nothing new, various technologies already exist and there is vast experience from across the world to draw upon.

British Energy is carrying out a Best Practicable Environmental Option (BPEO) study to compare the four identified options already in use worldwide (see Box 1 for the options). The BPEO exercise will assess a number of key factors, which we refer to as attributes, which determine the suitability of each option considered. These include: health and safety, technical, environmental, political and regulatory, and economic factors.

As part of this study we held two workshops and two public exhibitions in Leiston to hear the community's thoughts and views on the project. This leaflet outlines the views people put forward and how they are being used within the study.

### Box 1: The four options being considered within the BPEO are:

- *Reprocessing*
- *Dry storage in casks*
- *Dry storage in vaults*
- *Wet storage in ponds*

## Public exhibitions and community meetings

British Energy held four events in April/May 2009 to explain to key stakeholders and members of the public the options for managing spent fuel at Sizewell B after 2015 when the existing capacity will be reached. Two separate events were held for Sizewell residents and local councillors and for the Sizewell Stakeholder Group on 21 and 22 April, respectively. Two public exhibitions were held at Leiston United Church on 6 and 9 May. In total 190 people attended the four events. In addition, feedback on the plans was received from 28 people, who responded to the mailing of the booklet on Managing Spent Fuel and from British Energy staff who attended an exhibition at the power station on 21 April.

The purpose of the workshops and exhibitions was to provide the community around Sizewell with details of the Spent Fuel Management Project, including information about the proposed options and the Best Practical Environmental Option (BPEO) process. This was to ensure the communities views on the project can be captured and incorporated into the BPEO study.

## How people's views are being used

During the events participants were invited to raise questions and issues. These were then collated under the six attributes being used as part of the BPEO study: health and safety, environment, economic, political/regulatory, technical and other. Based on these responses and the input from the exhibitions and by mail, British Energy was able then to analyse this feedback and understand how participants at the events prioritised these issues.

The following table shows the percentage of issues and questions raised in relation to these six attributes (there is some rounding of the numbers so the total is just over 100%). This shows that the key issues for the local community were those around the environmental, technical and safety attributes.

Table 1

Attribute	% of issues raised
Environmental	27%
Technical	22.5%
Safety	20.5%
Economic	12%
Political/regulatory	11%
Other	8%

Within these six attributes participants at the events raised a wide variety of specific issues. Those that were raised the most or received the highest prioritisation are listed below:

**Table 2**

Issues that were raised the most or received the highest prioritisation from the public	
<b>Safety</b>	The risk of moving waste around Concerns about terrorist attack
<b>Technical</b>	The ability of any proposal to cope with technological change Concerns about nuclear waste in general and the absence of any long term solution to its storage
<b>Environmental</b>	The visual impact of any new buildings Issues around traffic to and from the site Impact on the Area of Outstanding Natural Beauty (AONB) Impact of climate change and rising sea levels
<b>Political</b>	The importance of political issues not being the priority Timescales for the final waste repository
<b>Economic</b>	The costs of storing nuclear waste
<b>Other</b>	The overlap with the proposed development at Sizewell C The ethical issues of a development that would last for well over 100 years: storing up problems for future generations The quality and openness of the BPEO study

British Energy has now gone through all the feedback from the events and mapped each of the issues raised (not just those listed above) against one of a number of sub-attributes, of which there are 47 in total, that it takes account of in the BPEO. The sub-attributes provide a more detailed breakdown of the main attributes mentioned earlier.

As an example, a number of issues were raised about the safety of managing spent fuel on site at the meeting with local residents on 23 April. Having heard these concerns we have then mapped them across to the relevant sub-attributes or in some cases created new sub-attributes.

Table three gives a number of examples of how people’s comments linked to particular sub-attributes.

**Table three**

Attribute	Issue raised at meeting	BPEO Sub-attribute that this refers to
Safety	Risk through moving radioactive waste around – transport, train, sea.	<b>S5. Security:</b> This attribute relates to the time that the spent fuel and the vitrified HLW packages spend outside nuclear licensed sites at any one time, i.e. during transport off-site and overseas.
	Traffic – heavy loads, for how long? Speed, construction, state of roads.	<b>S4.1 Number of Fatal and Serious Road Accidents:</b> This sub-attribute is scored by the number of fatal and serious road accidents that might occur, in relation to the number of transport kilometres travelled.
Safety	Safety – needs to be viable over full length of time. Contingency if reprocessing delayed.	<b>S3. Nuclear Safety and Risk:</b> This attribute addresses the ability of BE to meet the company accident risk criteria. It considers the potential radiological risk from worst-case accident scenarios of each option. It covers activities including construction, commissioning, fuel retrieval, transport, operation and maintenance of plant, waste package store operations, reprocessing and decommissioning.
	Radiation aspects – least worst options, low level emission, discharges to sea.	<b>S1.2 Public Dose from Discharges:</b> This sub-attribute is considered in terms of whether there is a potential for a dose to the public from routine liquid and aerial discharges.
Environmental	Visual – needs to blend ‘melt in’ not intrusive	<b>EN7.1 Land Use at SZB:</b> This sub-attribute considers the footprint of the options at SZB, in terms of their area in m <sup>2</sup> .

	Traffic – heavy loads, for how long?, speed, construction, state of roads.	<b>EN4.2 Number of journeys during Construction Phase:</b> This sub-attribute was added based on feedback from the local community stakeholder workshops, to highlight the total number of journeys that may occur during the initial construction phase.
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Each of these sub-attributes is then given a score, known as a weighting, to reflect how often the relevant issues were raised by stakeholders and the public.

The ten highest scoring sub-attributes as a result of the input are shown in table four – i.e. according to the feedback we have received from the meetings and by post, the most important issues were the environmental issues of: land use, visual impact at Sizewell B and transport issues arising from construction.

**Table four**

	<b>Sub-attribute</b>	<b>Attribute</b>
<b>1</b>	Land use	Environmental
<b>2</b>	Number of journeys during construction	Environmental
<b>3</b>	Visual impact	Environmental
<b>4</b>	Long term sustainability	Political
<b>5</b>	Technical robustness	Technical
<b>6</b>	Implementation flexibility	Technical
<b>7</b>	Life time costs	Economic
<b>8</b>	External hazards	Safety
<b>9</b>	Security	Safety
<b>10</b>	Programme risks	Economic

## Next Steps – Concluding the BPEO Study

British Energy is now in the process of assessing all this information. The BPEO model aims to recommend the option that is most in line with a wide variety of factors, including, safety, technical, and commercial considerations, time constraints, as well as stakeholder and public feedback. This does not mean that the option we select for a planning application will be one that meets all the issues raised during the public meetings, but rather will be the one that offers the best balance between these issues and the other factors we have to take account of.

We are aiming to have concluded this work by the autumn and to be in a position to feedback to you the results of the BPEO in October at which time we will also be able to talk about the process for implementing our preferred option. We expect to then be in a position to consult with you on any detailed planning application in the late autumn or winter. This will again take the form of a number of workshops and public meetings and exhibitions. We'll send you an invitation to these events later in the year.

Running alongside this process, we will be doing some work on an Environmental Impact Assessment using dry interim storage as a model. This is to ensure that, if this is the final option chosen, we will be ready to submit a comprehensive planning application. Dry storage is being used as a good model for any potential planning application, based on research from around the world, although that does not necessarily mean it will be the most suitable option for Sizewell B. In the event that one of the other onsite options is selected the majority of this preliminary work will be just as helpful for any alternative planning application.

# Your questions answered

In April and May British Energy held two meetings and two public exhibitions to get the community's views on managing spent fuel at Sizewell B. Over the course of these events nearly 200 people had the chance to comment on the four options being considered by British Energy and to ask questions. The following Q&A covers the broad range of questions asked.

## Reviewing the management of spent fuel at Sizewell B

### ***Why do you need to look at options for managing and storing spent fuel?***

At Sizewell 'B', in common with most other PWRs worldwide, a Fuel Storage Pond (FSP) is used for the storage of fuel but the capacity of this is limited. Under our current arrangements, we expect the FSP to be able to provide capacity up until around 2015 when a new plan for spent fuel management will be required.

### ***Why didn't you provide enough storage for the station's lifetime when it was built?***

It was never the intention that the station's lifetime fuel needs would be accommodated in the existing fuel ponds alone. The current ponds were built to a US-licensed design which under US regulation would allow storage of all spent fuel up to 2025, however due to differences in the safety arrangements between the US and the UK we will have used the currently authorised capacity by 2015.

### ***What are the options being considered?***

We are carrying out a Best Practical Environmental Option (BPEO) study. The initial process of the BPEO study looked through the various different options worldwide. It has identified four main options that we believe are feasible for Sizewell B: a second wet store at Sizewell B; a dry store using vaults; a dry store using casks; or the option of reprocessing. These options will now be examined further before a final decision is made.

### ***What other options have been discounted?***

Fourteen other options were discounted in the early stages of the BPEO process. These were either: technologies still in research or development; options that are contrary to UK law or policy; options that would simply not be available by 2015; or other locations that offered no advantage over Sizewell B.

### ***How will you decide?***

We are carrying out a Best Practical Environmental Option (BPEO) study at the moment which will help us to narrow down the most suitable options. This takes into consideration how the remaining four options perform against health and safety, technical, environmental, political and regulatory, and economic criteria.

### ***Is there a long term solution for dealing with the high level waste?***

The Committee on Radioactive Waste Management (CoRWM) has recommended that higher activity wastes should be buried deep underground in a national repository. The government has recently consulted on how to take these recommendations forward but has indicated that it could take many years before the repository is completed. In the meantime spent fuel and wastes can be safely and securely stored at nuclear sites on an interim basis until a repository is available. A White Paper on Managing Radioactive Waste Safely was published on 12 June 2008 inviting communities to come forward to discuss the terms on which they might host a repository.

### ***For how long will any building housing spent fuel at Sizewell need to last?***

Any building will need to last 100 years so as to meet recommendations from the independent CoRWM. It will only be needed to house spent fuel until such as time a national repository is available.

### ***Will you be taking spent fuel and nuclear waste from other sites?***

No, the project is not considering taking spent fuel from sites other than Sizewell.

### ***What will happen to the existing fuel ponds?***

The fuel ponds will continue to operate as they do now. The new solution (either storage or reprocessing) will be used to manage the older fuel once it has spent time in the fuel ponds to allow its heat to decay.

### ***Where will the new store be built?***

In the event that onsite storage is the selected option, BE is looking at a number of options for building within the existing licensed area of the Sizewell site.

### ***How big will any new storage building be?***

The actual size will depend upon the option and design selected. However, it is expected to be of the order of 50m wide by 110m long by 23 m high. Although it would be a large building it would be a similar size to many already on Sizewell B, and would therefore stand against the backdrop of the existing buildings.

### ***How do we know that the Best Practicable Environmental Option process is robust?***

British Energy has many years experience in running BPEO studies and works to guidelines set by one of our regulators the Environment Agency (EA). Both the EA and our other main regulator the Nuclear Installations Inspectorate (NII) will be scrutinising the process throughout.

### ***How will you protect any new spent fuel store from flooding?***

As a responsible operator, we have looked in detail at the impacts that climate change could have on our coastal sites. We have commissioned expert analysis on the potential effects of climate change, and on the measures required to maintain our sites over the next 100 years. The expert advice is that all our sites can be sustained with conventional engineering solutions.

### ***Is any decision taken on commercial grounds irrespective of the environment or safety?***

No decision is taken on purely economic grounds, in fact all of the options are only being considered as technologies already licensed and proven as safe and secure elsewhere in the world. The BPEO is designed to consider and develop a suitable balance between all of the health and safety, environmental, technical, political and regulatory, and economic issues surrounding the management of spent fuel.

### ***Will there be lots of increased traffic on the roads during the construction of a new fuel store?***

Construction will require an increase in activity and transport to the site and the Environmental Impact Assessment will need to consider how we minimise the impact of such activity. This will also form an important part of any planning application.

### ***Will this be built at the same time as the building of Sizewell C? If so will this mean we get even more construction traffic?***

No final decisions on new nuclear build sites have been made, so we can only speculate on the timescales for new build. If a new on-site store is built it will be a much smaller construction project in comparison. Any overlap of the two projects will be factored into the Environment Impact Assessments for both projects in an effort to limit any impact.

### ***How long will it take to build a new store?***

We anticipate that construction would take approximately 2-3 years.

### ***How much will it cost and who will pay for it?***

British Energy will pay for the full cost of whichever option is chosen, using money from the Nuclear Liabilities Fund. Rather like a pension fund, during Sizewell B's operating life, British Energy has been putting money aside into the Nuclear Liabilities Fund (NLF) to cover all the costs of managing the spent fuel arising from the station. The fund will also cover all the costs of Sizewell B's decommissioning at the end of its operational life. The cost of the spent fuel project will obviously depend on the option chosen and so it is too early to say at this stage what the final cost will be as details are still being worked up.

### ***How radioactive is the spent fuel?***

Spent fuel is highly radioactive which is why we take significant precautions to store it and to protect the public and the environment, and why we as an industry work to very stringent regulations.

### ***How long does it remain radioactive?***

Although it remains radioactive for many years, it is important to understand the nature of radioactive materials to get the true picture. Each radioactive material or 'radioisotope' has its own 'half-life' – the time taken for its radioactivity to fall to one half of its original value. Half-lives vary enormously in terms of time depending on the radioisotope. If a substance has a very short half-life, this means it is giving out its total amount of radiation very quickly. If on the other hand, it has a very long half-life it is giving out radiation very slowly, so the amount given out in a particular period of time will be less.

### ***How do you prevent radiation from escaping either into the atmosphere or water supply and what secondary measures are in place?***

The fuel is always shielded to provide protection to the public and staff. This is using water, steel or concrete, all of which provide very effective barriers against radiation. For staff working on fuel handling or transport we use the principles of time, distance and shielding to ensure they get little or no exposure during their work and remain well within the accepted safe level of dose rate for UK radiation workers. As with all existing systems on the power station, the chosen spent fuel management option will have appropriate measures in place to monitor and limit any radioactive emissions. This will ensure they remain within the limits prescribed by our regulator the Environment Agency.

### ***How can you justify further building in an area of outstanding natural beauty (AONB)?***

Although it would be a large building it would be a similar size to many already on Sizewell B, and would therefore stand against the backdrop of the existing buildings. We are sensitive to the fact that we are operating within an AONB and we'll do what we can to limit the visual impact of any building. This will form an important part of any planning application at a later stage.

### ***Will Sizewell C use the same fuel stores as Sizewell B?***

Our priority is to ensure that Sizewell B has a spent fuel management plan beyond 2015 regardless of whether Sizewell C is built.

### ***How will Sizewell C store its fuel?***

Plans for the new nuclear spent fuel storage are being developed as part of any proposals and Environmental Impact Assessment for potential new nuclear build.

## **Reprocessing fuel**

### ***Is it safe and ethical to reprocess spent fuel?***

It is being considered as a process that has been used in the UK and other countries, so it is a proven, safe and secure technology. It has also has some advantages in that it reduces the overall amount of high level waste needing to be stored and can gain an extra 25% energy from the fuel, therefore reducing the need for mining raw materials for new fuel.

### ***Can you reprocess in the UK?***

In theory we could reprocess the fuel at Sellafield, however there are currently questions over the long term plans for the THORP reprocessing plant and whether it would have the capacity to deal with fuel from Sizewell B. A new plant could in theory be built but it would not be possible to get one up and running by 2015.

### ***Does this mean you will reprocess the fuel overseas?***

Reprocessing overseas is one of the options being looked at within the BPEO study.

### ***How will you transport spent fuel and how can you be certain this will be secure?***

Depending on where the fuel will be reprocessed, the fuel is likely to be transported via road, rail or sea in fuel flasks, which are rigorously tested against major impact, fire and extreme water pressure. In the UK alone we have over 45 years of experience of transporting both new and reprocessed fuel safely and securely, which equates to around eight million miles travelled.

### ***What will happen to the waste products from reprocessing overseas? Where will that be stored?***

We would expect that high and intermediate level waste products would be returned to the UK for storage, possibly at Sizewell. These would be returned in a very stable form (for example vitrified glass for HLW), and packed into very resistant steel casks that can be safely stored and cooled by natural convection (there would be no need for fans, or electrical cooling systems). The recovered fissile materials (uranium and plutonium) would be made available to us either for manufacture of new fuel assemblies or packaged for final disposal in the UK.

### ***Will you need a building on site to house high level waste from reprocessing?***

Any waste products from reprocessing would eventually need to come back to the UK, and quite possibly to Sizewell B, which would therefore need a waste store. However, this would depend on the availability of temporary storage at Sellafield and the progress of identifying and building a national repository.

### ***Isn't reprocessed fuel more radioactive and therefore more dangerous?***

It is not significantly more radioactive and there is no reason to consider it particularly any more dangerous. We have many years of experience in the safe transportation and handling of reprocessed fuel.

## **Dry storage at Sizewell B**

### ***How does dry storage work?***

There are two options for dry storage being looked at. The most commonly used approach is for spent fuel to be placed in massive steel or concrete casks which are designed to provide a safe and effective barrier between the fuel and the outside environment. The steel casks would then be stored in a secure building. The second option is storing the fuel in concrete vaults. Again this would be within a secure building.

### ***What about terrorism? Isn't a dry store more vulnerable to terrorist attack?***

The storage facilities being looked at are of an internationally proven design in which the safety of the public, the environment and the employees has been considered as paramount. They have been tested to withstand major impact and fire. Sizewell B already has robust security arrangements in place and our proposals will be examined by the UK's independent government security regulator, the Office of Civil Nuclear Security (OCNS), which is now part of the Health and Safety Executive (HSE) alongside the Nuclear Installations Inspectorate (NII). The OCNS would need to be entirely satisfied that the proposed facilities have appropriate safety and security systems in place before they could be built.