Respondent Details

Name:

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Organisation:

Lightbridge Corporation

Medium business (50 to 250 staff)

The consultation document sets out the Government's proposed approach to the longer term management of the UK's plutonium stocks for public scrutiny and consultation. Comments on any aspect of this issue are welcome, but the key questions posed in this consultation are:

No

Question

Q1

Do you agree that it is not realistic for the Government to wait until fast breeder reactor technology is commercially available before taking a decision on how to manage plutonium stocks?

Response

Yes. Although fast reactor technology is promising, many of the leading research and demonstration projects around the world have been cancelled due to funding and/or lack of commercial market pressure to further development of fast reactors.

Q2

Do you agree that the Government has got to the point where a strategic sift of the options can be taken?

Response

Yes. The three high level options laid out in the "Management of the UK's Plutonium Stocks" report are the appropriate initial options to evaluate and can be done so with a goal of making an informed, forward-looking decision.

Q3

Are the conditions that a preferred option must in due course meet, the right ones?

Response

Yes. A responsible decision should consider the safety, security, total cost, value and practicality of the solution. It should be noted that additional economic benefit to the country could also be included as a condition. Such a benefit could be realized in the form of additional job creation and potential development of advanced technologies for plutonium management that could be utilized to bring revenue to the UK.

Q4

Is the Government doing the right thing by taking a preliminary policy view and setting out a strategic direction in this area now?

Response

Yes. The current practice of storing plutonium will no doubt bear additional costs in terms of safety and security of the material with no realization of tangible benefit in terms of decreased plutonium stock.

Implementation of new solutions will require a significant amount of

time and planning and it is prudent to begin such planning now.

Q5

Is there any other evidence government should consider in coming to a preliminary view?

Response

Yes. Lightbridge Corporation is developing an advanced metallic fuel for light water reactors (LWRs) that could be utilized to provide a significant benefit in terms of plutonium stockpile reduction, ultimate disposal requirements, and implementation costs compared to MOX fuel. See response to Q6 below for more information.

Q6

Has the Government selected the right preliminary view?

Response

The preliminary view of continued storage, immobilisation or reuse as fuel is the correct view. However, although MOX fuel has been demonstrated it is not the most effective option for plutonium disposal as the high (> 90%) UO2 concentration leads to a very poor plutonium incineration of ~ 30% of the initially loaded material. When coupled with the economic costs of MOX fuel fabrication and low fuel loading

(typically MOX assemblies are limited to ~30-40% of a standard PWR core) the low incineration rate significantly hinders the potential throughput and therefore time required for disposal of the plutonium stockpile.

Conversely, plutonium-bearing fuels with no uranium present can realize ~70% plutonium incineration and significantly reduce minor actinide creation. This provides a back-end fuel cycle benefit in regard to ultimate disposal of the used fuel that cannot be realized in LWRs with high concentrations of uranium and plutonium (i.e., MOX).

Lightbridge's preliminary estimates suggest that, unlike MOX, a standard PWR could operate while loaded with 100% of our metallic fuel assemblies, greatly increasing the throughput of the disposition program. This could be done without suffering a penalty to electricity generation or to the reactivity coefficients that help maintain a naturally safe operating response of the reactor during off-normal events.

Q7

Are there any other high level options that the Government should consider for long-term management of plutonium?

Response

The high level options of storage, immobilization, or reuse as fuel are the correct options. However, we believe that in light of the goal of disposing of plutonium in the most efficient way, other promising fuel

technologies with the potential to be deployable in commercial light water reactors over the next decade should not be discounted at this time. In our judgment, the current Pu storage situation in the UK affords additional time for the country to investigate and/or support development of our advanced fuel technology in addition to the ongoing evaluation of MOX.

Lightbridge has been developing this metallic fuel technology for a number of years and has several near-term irradiation demonstrations planned that will provide quantitative data for evaluation of a uranium-bearing version of the metallic fuel. This fuel variant offers enhanced robustness compared to oxide fuels and can be used to realize power uprates of up to 30% in standard PWRs, resulting in a significant reduction in total levelized cost per kilowatt-hour of electricity generated. Lightbridge believes the plutonium variant of this fuel could also be used to provide increased power output which could offset some of the disposition program costs.

As Lightbridge is a technology licensing company, not a fuel vendor, the intellectual property rights to the fabrication and use of the metallic fuel could be licensed to the UK such that the plutonium disposition program could foster job creation locally.