**GE Hitachi Submission to the UK Government Consultation on the Long-Term Management of UK Owned Separated Civil Plutonium**

GE Hitachi (GEH) applauds the UK Government's plan to develop a policy for the long-term management of the UK's plutonium stocks, but the consultation document for public scrutiny and consultation has missed a different, arguably more viable, option. This different option would involve consuming plutonium as a metal fuel (and not as an oxide fuel as identified in the consultation document) in a modern sodium-cooled reactor that can be readily licensed and deployed in the UK. We therefore respectfully disagree with the UK Government's preliminary policy view that re-using the plutonium in the form of MOX fuel (mixed oxide fuel) offers the best prospects to deliver a solution for long-term storage. For the avoidance of doubt, we do agree that re-using plutonium should be the solution rather than disposal, but we believe that the way this re-use is achieved through our alternative option offers much better prospects. Our comments here address your key questions posed and seek to provide you a cogent alternative for managing the UK's plutonium.

The consultation document sets out the reality about the management of UK-owned civil and weapons plutonium, of which the UK has accumulated significant quantities. In the consultation document, you indicate that the UK is saving plutonium for fast reactors. In the U.S., however, fast reactors were developed in the 1970s to generate plutonium for light water reactors. We understand that the UK abandoned R&D for fast reactors because it considered fast reactors would not be commercially viable for electricity production in the foreseeable future. This determination was most likely based on use of MOX fuel. We see plutonium in the metallic form as an economical fuel for a sodium-cooled reactor that produces electricity, pre-treats used light water reactor fuel for disposal, and increases available UK energy reserves.

Below are our opinions for a possible path for the UK government to take into consideration in our response to the questions raised.

**Q.1.** Do you agree that it is not realistic for the UK Government to wait until fast breeder reactor technology is commercially available before making a decision on how to manage plutonium stocks?

**GEH Response:** No. The UK government can use modern sodium-cooled reactor technology that was developed during the US Advanced Liquid Metal Reactor Program. The reactor was tested at both the Fast Flux Test Facility and the Experimental Breeder Reactor – II. The conceptual design has been reviewed by the US Nuclear Regulatory Commission, which issued the public document (NUREG 1368) documenting that it did not see any impediments to licensing this reactor.

The use of MOX fuel in a fast reactor is costly. In contrast, the use of metallic plutonium fuel in a modern sodium-cooled reactor results in better operability, is safer, and is economically viable, especially when taking into consideration repository cost savings.

**Q.2.** Do you agree that the UK Government has got to the point where a strategic shift of the options can be taken?

**GEH Response:** No. The document states "Putting plutonium beyond reach can be achieved in two principal ways: (a) through disposal as an immobilized waste or (b) through reuse in the form of mixed oxide nuclear fuel (MOX) which, after use as fuel in nuclear reactors, leaves spent fuel in a state where it can be prepared for permanent disposal." A third more economical way has been omitted, namely, metallic fuel in a modern sodium-cooled reactor such as GE Hitachi's PRISM reactor, and we would seek that this alternative viable option be given thorough consideration before making any preliminary policy decisions.

**Q.3.** Are the conditions that a preferred option must in due course meet, the right ones?

**GEH Response:** Yes. Society paid a hefty economic price and invested considerable resources to produce and separate this plutonium. Disposal as an immobilized waste has been viewed as unviable (for a variety of security and policy issues) by the two largest weapons states, the U.S. and Russia. It is time the option of using metallic fuel in a modern sodium-cooled reactor be considered. This option, which would involve simply placing the plutonium into a metallic form, fabricate fuel, and place it into a proven modern sodium-cooled reactor to generate electricity for the energy market, would maximize the energy value extracted from the plutonium and reduce the resource consumption from other energy sources.

**Q.4.** Is the UK Government doing the right thing by taking a preliminary policy view and setting out a strategic direction in this area now?

**GEH Response:** Yes. The UK Government should consider a policy of turning this legacy plutonium into an energy asset in a metallic fueled, sodium-cooled reactor. This is a significant policy decision that perforce must include modern sodium-cooled reactors.

**Q.5.** Is there any other evidence the government should consider in coming to a preliminary view?

**GEH Response:** Yes. More detailed consideration should be given to the alternative viable option of re-using plutonium as metal fuel in a modern sodium-cooled reactor. Gaining further understanding about the results of the Advanced Liquid Metal Reactor Program and the efforts by GEH in the recent Global Nuclear Energy Partnership will provide further evidence in support of this alternative viable option.

**Q.6.** Has the UK Government selected the right preliminary view?

**GEH Response:** No. We would like to make reference to the following statement in the document: "Reusing plutonium as MOX fuel is a more mature option. For this reason it was adopted by the US and Russia as the method which will be used to manage their excess weapon grade plutonium under the Plutonium Management and Disposition Agreement that they both signed." This statement oversimplifies the issue and excludes

the extremely high costs associated with using MOX fuel in LWRs in the United States. It bears mentioning that plutonium as a fuel has value. The form of plutonium in the reactor does have a significant impact on the extent of the value, and the generation of electricity can offset the cost of the fuel fabrication and reactor capital equipment.

**Q.7.** Are there any other high-level options that the UK Government should consider for long-term management of plutonium?

**GEH Response:** Yes. The alternative viable option of re-using plutonium as metal fuel in a modern sodium-cooled reactor, such as the PRISM reactor, should be considered, and we believe that it provides the best available solution for the UK Government. Deploying this approach will also enable the UK to lead the world on a better path for the permanent disposition of plutonium while at the same time both recovering the cost of the disposition through electricity generation and acting as a disposition service for LWR used fuel. The safest, and most efficient, place for plutonium to be is inside a reactor generating power.

Based in Wilmington, N.C., GE Hitachi Nuclear Energy (GEH) is a world-leading provider of advanced reactors and nuclear services. Established in June 2007, GEH is a global nuclear alliance created by GE and Hitachi to serve the global nuclear industry. The nuclear alliance executes a single, strategic vision to create a broader portfolio of solutions, expanding its capabilities for new reactor and service opportunities. The alliance offers customers around the world the technological leadership required to effectively enhance reactor performance, power output and safety.

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