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A range of variables make any actual estimate of MOX loading in Japan highly speculative. Over the last ten years, Japan's plutonium program has suffered major setbacks, including accidents at its experimental Fast Breeder reactor, Monju, and cancellation of the ATR (Advanced Thermal Reactor) program. Turning to the option of burning all of its plutonium in conventional thermal reactors - both Pressurized and Boiling Water types - Government policy dictated to the utilities in 1996, has suffered major setbacks - technically (including quality control failures), as well as politically and in terms of public acceptance.

"If the nuclear fuel cycle is implemented, plutonium will rapidly build up. At some point in time we need to really think about this." Fukushima Governor Eisaku Sato, June 3rd 2002, as reported in *Asahi Shimbun*, June 4th 2002.

The current stalemate in the MOX program could very well continue for the coming years, particularly if ongoing doubts and cover-up's over quality of European MOX persist. In addition, safety and economic issues, as well as the serious challenges presented by the Governor of Fukushima and the public opposition in Niigata and Fukui/Kansai region are major on-going factors.

The MOX program stalemate could however also be broken within the next few years. The latter scenario would lead to MOX loading in the four licensed reactors in Fukui (Takahama-3 and 4), and Niigata (Kashiwazaki-Kariwa 3) and Fukushima (Fukushima I-3). The loading of these reactors with European produced MOX would be increased to the 30% of total reactor fuel being MOX within three years of start-up, followed by refueling over the following years. The figures of total plutonium loading are based on the French experience, where with 20 reactors licensed and loaded with MOX, annual plutonium use is in the range of 5-5.5 tons. Our calculations are based upon ten reactors licensed and loaded to 30% of their cores by 2008-10.

Moving beyond the current four Tokyo Electric and Kansai Electric reactors it is not obvious which utilities would apply for a MOX license. One of the strongest advocates of plutonium MOX is Chubu Electric, however, it is for the foreseeable future embroiled in the safety scandals over the Hamaoka nuclear power plant with mounting pressure to have their only reactors closed down. Plans for Kyushu Electric to apply for a MOX license for its Genkai reactor were frozen in the 1999 as a result of the fallout of the British Nuclear Fuels MOX scandal with no prospect of an early application. One reactor option that is rumored to be planned is for the licensing of the Tsuruga-2 reactor also in Fukui Prefecture. This reactor is owned by all nine 'private' nuclear utility's operating under JAPCO. Other options include Tokyo Electric applying to license additional BWR's at its Fukushima and Kashiwazaki-Kariwa sites.

There is no indication as of June 2002 of an early MOX license application at any additional reactors in Japan. Licensing, once applied for with the Ministry of Economy, Trade and Industry (METI) as well as Prefectural Government's, will almost certainly provoke further public and political resistance, further delaying the granting of any license beyond two years. None of this takes account of the on-going debate inside certain large utilities about the merits of large scale MOX use including economics.

In addition, unlike European utilities, Japanese plutonium stocks amounting to 45 tons by 2006-10, are located in Europe at the BNFL Sellafield site in England, and the Cogema la Hague site in France. Each shipment of MOX fuel generates strong and increasing opposition from the tens of en-route countries threatened. In addition to the long-standing environmental and safety concerns, the security issues, a factor throughout the 1990's have taken on a new urgency in the post-September 11th world. There is no guarantee that Japan will be successfully able to transport all of its plutonium back to Japan in the form of MOX given these factors, further influencing debate in Japan (in particular within the Foreign Ministry) over the merits of the MOX program.

Taking all these factors into account, ten reactors licensed and loaded with MOX by 2020, never mind 2010 seems highly unlikely. However, change in Japanese nuclear policy, in particular on the long-committed plutonium program, is not just determined by the energy debate. Strategic and defense factors are at least half of the equation, and may become an increasing determinant.

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