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A Proposal of Multilateral Nuclear Fuel Cycle Approach: “International Nuclear Fuel Management Arrangements (INFA)”

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Conditions for A Multilateral Approach?

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- **Universality**
 - Discrimination between “have” and “have not” should be avoided
- **Transparency**
 - IAEA Additional Protocol or equivalent safeguards arrangements should be applied
 - Additional layer of “verification”
- **Economic Viability**
 - Should be consistent with global nuclear fuel market activities
 - Economic rationale should be clearly defined to support nuclear fuel cycle programs

A Proposal for International Nuclear Fuel Cycle Arrangements (INFA)*

5 Recommendations:

1. Reduction of “Surplus Weapons-Useable Materials”
2. Internationalization of Nuclear Fuel Cycle facilities and Establishment of Joint Stockpile
3. Voluntary Code of Conduct of the Nuclear Industry and Nuclear non-proliferation and disarmament Fund
4. Reexamination of Japan’s nuclear fuel cycle programs
5. Research Initiative for Advanced Nuclear Power Systems without Weapons-Usable Materials

*Tatsujiro Suzuki, Tadahiro Katsuta, “A Proposal for Multinational Nuclear Fuel Cycle Approach,” January 2009.

Reduction of “Surplus Weapons-Useable Materials”(1)

- Existing stockpile will be consumed first before further reprocessing
 - On-site dry cask storage is top priority for spent fuel management
- “No Surplus” principles should become a global norm
 - For enrichment and reprocessing service, “demand must be specified *before* supply”
 - Enrichment services will be supplied only when reactor order is confirmed
 - Reprocessing service will be supplied only when plutonium fuel order is confirmed
 - Users/suppliers will report its “supply/demand plan” annually to the IAEA

JAEC's "No Pu surplus policy"

- In August 2003, JAEC announced its new guideline for plutonium management
- Utilities are expected to submit **its plutonium usage plan annually *before* separation of plutonium.**
- Its plan is supposed to include the information on:
 - (1) current plutonium stock
 - (2) planned usage of plutonium (name of power plant, or site, insertion period)
 - (3) amount of reprocessing (during that year)
 - (4) usage of plutonium (during that year)
 - (5) MOX contract plan and fabrication amount (during that year).

Reduction of “Surplus Weapons-Useable Materials”(2)

- International Plutonium Disposition Program(IPDP) should be established by Pu owners’ countries
 - Utilities (owner of plutonium) can declare “**excess plutonium which will be exchanged with low enriched uranium**” (from stockpile) (1 tPu ~ 1GW reload of LEU)
 - Excess plutonium will be given to the Program and be disposed by commercial bid
 - most likely by MOX fuel and LWRs
 - Principle is “minimum cost, minimum transportation, minimum time”
 - Costs (\$10million~\$100mill/tPu) will be shared by plutonium-owner countries

Internationalization of Nuclear Fuel Cycle facilities and Establishment of Joint Stockpile

- All fuel cycle facilities should be “internationalized” without exception.
- A country (or institution) has three options for enrichment and reprocessing facilities
 - (A) Own and operate its own facilities (with international participation)
 - (B) Only own the share of facilities (multinational facilities)
 - (C) No ownership and rely on international service
- Suppliers/Consumers establish **joint stockpile** of natural uranium and enriched uranium
 - (A) will pay the stockpile cost (~ \$40 million for 1GWy LEU, \$60 million for 1GWy fabricated fuel)
 - (A) also shall guarantee provision of emergency storage capacity for spent fuel from the fuel provided by it.
 - (C) has the top priority to access the stockpile

Voluntary Code of Conduct of the Nuclear Industry and Nuclear non-proliferation and disarmament Fund

- Global nuclear industry should establish **nuclear disarmament and non-proliferation principles** which all corporate members will adopt
 - Non participation in weapon activities
 - Non transfer of sensitive technologies
 - Best practice in safety and physical protection

Voluntary Code of Conduct of the Nuclear Industry and Nuclear non-proliferation and disarmament Fund

- Japan should call on the countries possessing nuclear industry, working with private banks, to establish a “Nuclear Nonproliferation and Disarmament Fund” which can invest in the companies that observe the abovementioned three principles.
- The Fund shall provide support to the developing countries to contribute to capacity building for the observance of the three principles.

Reexamination of Japan's nuclear fuel cycle programs

- **The nuclear fuel cycle policies of Japan are in a chaotic situation.** This should be taken as an opportunity to conduct a fundamental review.
 - In particular, the Rokkasho reprocessing plant, which is out of operation now, is not needed from the viewpoint of plutonium demand.
 - **Its future should be examined with the possibilities of either turning it into an international facility increasing its spent fuel storage capacity or shutting it down.**
- Concerning the enrichment facility, if an increase of demand in Asia can be expected, its international competitiveness should be strengthened with the aim of internationalizing it

Research Initiative for Advanced Nuclear Power Systems without Weapons-Usable Materials

- As long term options, Japan can initiate research programs not involving sensitive nuclear materials
- Examples of such advanced system
 - Uranium from seawater
 - Chemical enrichment process
 - Thorium MOX fuel for plutonium disposition

Strengthening Nuclear Security Measures

- Japan should enhance its nuclear security measures aiming at the world-best standards and contribute to strengthening world-wide nuclear security measures
 - Adopting “best practices” of nuclear security measures through international collaboration
 - Taking a leadership in developing advanced technologies (such as nuclear forensics, ultra-sensors)
 - Improve domestic security measures such as:
 - Protection of radioactive materials in universities and hospitals
 - Enhance “security clearing measures” for all employees
 - Join international efforts such as World Institute for Nuclear Security (WINS)

Reference

Various Proposals for Multinational Nuclear Fuel Cycle Approaches (MNA)

- US: Global Nuclear Energy Partnership (GNEP)
- Russia: International Uranium Enrichment Center and Nuclear Fuel Bank
- NTI (Nuclear Threat Initiative): International Fuel Bank
- Germany: Multinational Enrichment Center
- 6 Country Proposal: Nuclear Fuel Assurance Backup system (Japan's proposal: Standby System)

Why has MNA never been realized yet?

- Double Standards and In-equality
 - All proposals have been made by “Have” countries
 - “Have not” countries feel “unfair” (ROK vs Japan)
- Not enough transparency
 - Conditions for fuel assurance/access to technologies are not clear
 - Not enough incentives to give up technologies/facilities
- Lack of effective utilization of market mechanism
 - Could interfere (existing) “effective” market transactions
 - Government's intervention needs to be minimized
- Difficulties of siting spent fuel/waste facilities remain unchanged