

Study on Sustainable Regional Nuclear Fuel Cycle Framework from Nuclear Non-Proliferation Viewpoint

Y.Kuno (University of Tokyo and Japan Atomic Energy Agency)



Peaceful Use of
Nuclear Energy



Nonproliferation, security, safety



Propose

"Sustainable Frameworks for Multi-national fuel Cycle"

- ❑ Peaceful use of nuclear energy in equal basis
- ❑ Non-proliferation, nuclear security and safety (3S)
- ❑ Solutions for
 - ❑ Stable supply of nuclear fuel
 - ❑ Spent fuel management
- ❑ Economical, functional, industrial viability
- ❑ Enhance reliability of international / regional community

Basic Concept on Our MNA

Regional Nuclear Fuel Cycle (Front/Back End)



1. Establish MNA on 1) Nuclear- Nonproliferation, 2) Sustainability, and 3) Feasibility.
2. Compatibility of “inalienable right (equality)” and “nuclear non-proliferation” in peaceful use of nuclear.
3. Pursue Closed Fuel Cycle with long-term storage for regional energy security: open cycle is out of our scope from the viewpoints of 1) NNP (to avoid worldwide proliferation of Pu-contained spent fuels; Pu-mine) and 2) reduction of Environmental burden and 3) saving of repository space.
4. Comply with the most stringent safety, safeguards and security (3S) requirements
5. Hold the same (or higher) level of nuclear non-proliferation (NNP) function as the existing NNP measures (including bilateral nuclear agreement)
6. Establish Regional Accountancy/Safeguards (RSAC) & rigid control of sensitive technologies

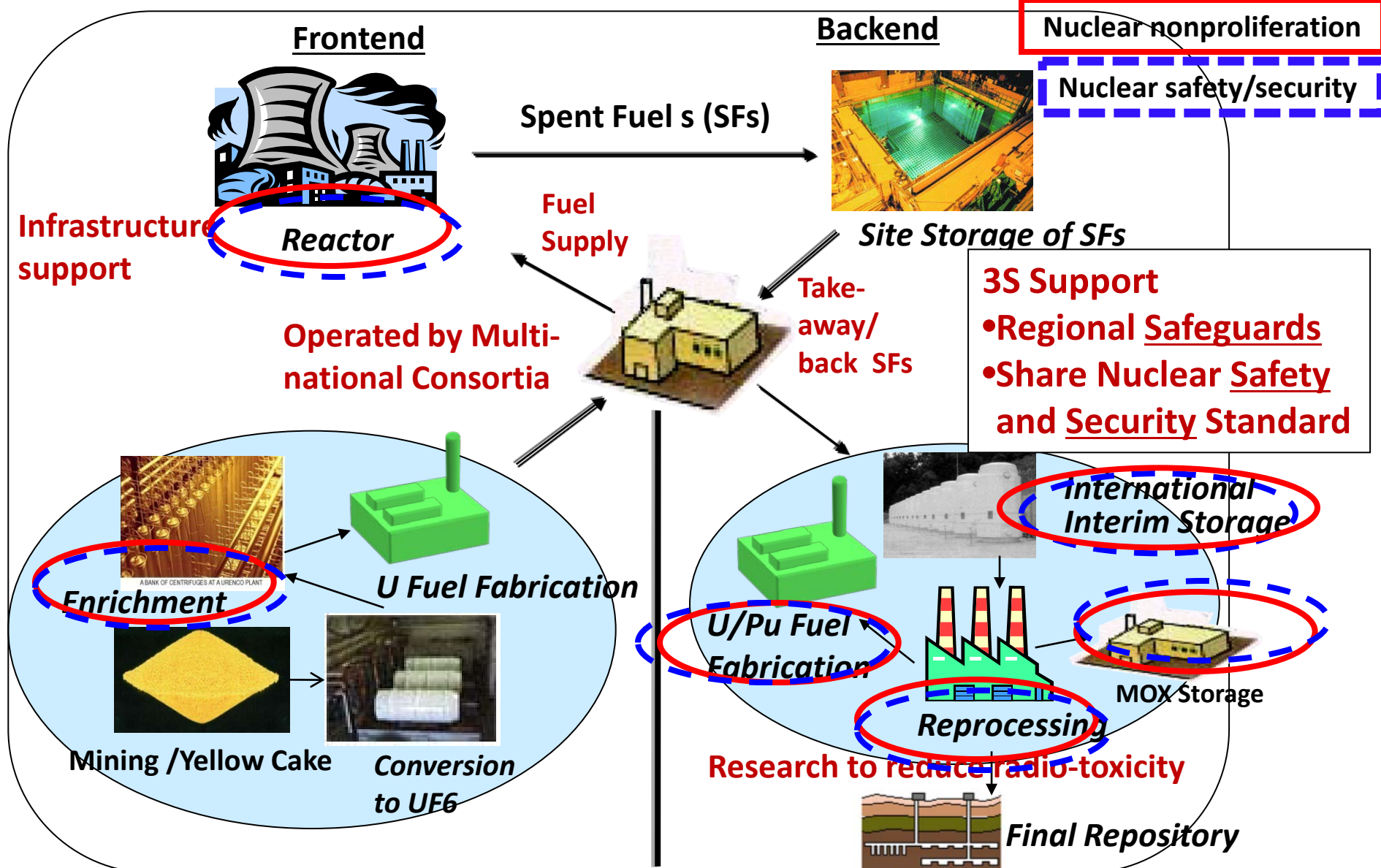
Prerequisites for Formulation of MNA

	Nonproliferation			
	NPT Article IV (Right of Peaceful Use)	Safeguards	Nuclear Security	Export Control within MNA
<p><u>Host State / Site Provision State:</u> <u>Provision of services of fuel supply , SF storage & reprocessing</u> existing/ new joint facilities</p>	<p>Member states: <u>Criteria-based,</u> <u>nuclear safety, security standards and NSG criteria*</u> Site-provision states (host): <u>any member state, not regarded technology holder.</u> Partners: <u>any member state not possess facilities</u></p>	<p><u>Regional safeguards (RSAC)</u> <u>Accountancy: by utility and MNA</u> <u>Inspections: by MNA in cooperation with IAEA</u></p>	<p><u>International Standards</u> <u>Security audit by MNA</u></p>	<p><u>MNA members: to be Members of NSG</u> <u>NSG Criteria* :Guidelines' "objective"/ (excluding "subjective") of INFCIRC 254/Part1 - 6,7 (revised in June 2011): CAS+AP (equivalent), Nuclear Security, Nuclear Safety Treaty, NSG Guideline.</u></p>
<p>MNA Member Stats with only Reactor Operation (partner)</p>	<p>National (or utility's) facility Enjoy services of fuel supply & reprocessing including with safeguards, meet nuclear safety, security standards and NSG criteria*</p>	<p>Regional (MNA) safeguards Same as above but Accountancy by each state (utility)</p>	<p>International Standards Security audit by MNA</p>	

Table Prerequisites for Formulation of MNA

	Assurance of Supply	Selection of Host States	Access to technology	Multilateral involvement	Economic s
<u>Host State / Site Provision State: Provision of services</u>	MNA to provide services to partner states of LEU fuel supply, SF storage and reprocessing	Extra territorial status for MNA siting State with political stability	Access should be permitted only to technology holder	Provision of AOS with ownership transfer of facilities to MNA. MNA for ownership; Technology holder, committed by MNA, for control and operation. MNA for development, mainly SF treatment	Increase economy compared with the case by individual states (Incentive to MNA on competitive-ness of economy vs individual states' investment)

MNA Member Stats with only Reactor Operation	Part EN S nuc	Trans- portation	Safety	Nuclear Liability	Political and public acceptance	Geo- politics	Legal Aspect
<u>Host State / Site Provision State: Provision of services</u>		International standards on the transportation of nuclear material Mutual Cooperation within MNA Member States	<u>International nuclear safety standards</u> <u>Safety audit by MNA</u>	MNA (among Member States) to cover certain level liability	Significance and social acceptability	Host state / region with political stability	Agreement on MNA Need to mutually adjust variances among related laws/ agreements
MNA Member Stats with only Reactor Operation		-	<u>International nuclear safety standards</u> <u>Safety audit by host state</u>	States to individually join international nuclear liability convention			



Any country has a right on its own nuclear fuel cycle options, if it meets specific prerequisites, as discussed in NSG.

Possible Regional Framework of Future Nuclear Fuel Cycle