



**Policy Research “Review and
Analysis of Japan's efforts to
Ensure Nuclear Non-proliferation”**

**Policy Research Office
Nuclear Nonproliferation Science and Technology Center
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- ✓ **Review, analyze and evaluate Japan's efforts** to ensure nuclear non-proliferation since the early days of nuclear energy use, dividing such nuclear non-proliferation efforts into seven categories (See Attachment: History of Japan's efforts to win the trust for the peaceful nature of the nuclear energy use and essential elements)
- ✓ **Extract essential elements** in terms of winning trust for the peaceful nature of the nuclear energy use for each of the seven categories and **classify extracted essential elements** into three categories
- ✓ **Identify challenges** to be addressed from the viewpoint of promoting nuclear energy while ensuring nuclear non-proliferation domestically as well as globally
- ✓ This report could be helpful to other states, **especially states which plan to introduce nuclear power program for their reference**

Five measures to ensure Japan's commitment not to acquire nuclear weapons

- ✓ Legislative measures to ensure peaceful use of nuclear energy
- ✓ Commitments and cooperation for international regime for nuclear non-proliferation
- ✓ Safeguards
- ✓ Efforts to secure transparency of peaceful use of nuclear energy
- ✓ Measures to ensure nuclear nonproliferation in nuclear facilities which process sensitive nuclear material

Two measures to ensure non-proliferation of nuclear equipment, material and technology from Japan

- ✓ Export control and control of sensitive nuclear technology
- ✓ Physical protection and nuclear security

Essential elements in terms of winning confidence and future challenges

- ✓ Classify essential elements into **3 categories** based on Japan's experience

- A. Necessary items regardless of the existence of nuclear activities
- B. Items which accompany nuclear activities
- C. Items which accompany nuclear fuel cycle activities

Categories	Essential elements
Legislative measures	<ul style="list-style-type: none"> ✓ Pledge for the limitation of the nuclear energy use for peaceful purposes in the domestic law ✓ Legislative measures to ensure this pledge
Commitments and cooperation for international regime for nuclear non-proliferation	<ul style="list-style-type: none"> ✓ Commitment not to acquire nuclear explosive devices (NPT) ✓ Commitment not to carry out nuclear explosion (CTBT) ✓ Compliance with bilateral nuclear cooperation agreements ✓ Commitments and cooperation for other international efforts or to international organizations, to ensure nuclear non-proliferation
Safeguards	<ul style="list-style-type: none"> ✓ Ratification of Comprehensive Safeguards Agreement ✓ Establishment of SSAC ✓ Ratification of Additional Protocol ✓ Introduction of integrated safeguards ✓ Compliance with safeguards agreement ✓ Cooperation with IAEA to address challenges for the application of safeguards ✓ Cooperation for the establishment of the framework of safeguards and the development of safeguards technology

Categories	Essential elements
<p>Efforts to secure transparency of peaceful use of nuclear energy</p>	<ul style="list-style-type: none"> ✓ Adoption of nuclear energy policy and its public disclosure by the Atomic Energy Commission ✓ Disclosure of the discussion towards the revision of nuclear energy policy and the participation of the general public in the process ✓ Review of the implementation of nuclear energy policy and nuclear non-proliferation policy ✓ Participation in the discussion for the establishment of international regime for plutonium use ✓ Disclosure of the information on the current plutonium use and on future utilization plan
<p>Measures to ensure nuclear nonproliferation in nuclear facilities which process sensitive nuclear material</p>	<ul style="list-style-type: none"> ✓ Deployment of proliferation resistant nuclear technology ✓ Cooperation on the conversion of the core of research reactor from high enriched uranium use to low enriched uranium use and the return shipment of high enriched uranium

Categories	Essential elements
Export control and control of sensitive nuclear technology	<ul style="list-style-type: none">✓ Export control in accordance with NSG Guidelines✓ Participation in other international framework for export control and counter-proliferation efforts✓ Efforts to ensure control of sensitive nuclear technology within the relevant organizations
Physical protection and nuclear security	<ul style="list-style-type: none">✓ Ratification of Convention on Physical Protection of Nuclear Material (CPPNM)✓ Ratification of International Convention for the Suppression of Acts of Nuclear Terrorism✓ Application of measures in accordance with the latest version of INFCIRC225✓ Participation in other international efforts for nuclear security

Classification of essential elements of nuclear non-proliferation efforts into three categories

Category	Essential elements of efforts to ensure nuclear non-proliferation	A	B	C
Legislative measures	<ul style="list-style-type: none"> ✓ Pledge for the limitation of the nuclear energy use for peaceful purposes in the domestic law ✓ Legislative measures to ensure this pledge 		<input type="radio"/> <input type="radio"/>	
Commitments and cooperation for international regime for nuclear non-proliferation	<ul style="list-style-type: none"> ✓ Commitment not to acquire nuclear explosive devices (NPT) ✓ Commitment not to carry out nuclear explosion (CTBT) ✓ Compliance with bilateral nuclear cooperation agreements ✓ Commitments and cooperation for other international efforts, or to international organizations, to ensure nuclear non-proliferation 	<input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/>	
Safeguards	<ul style="list-style-type: none"> ✓ Ratification of Comprehensive Safeguards Agreement ✓ Establishment of SSAC ✓ Ratification of Additional Protocol ✓ Application of integrated safeguards ✓ Compliance with safeguards agreement ✓ Cooperation with IAEA to address challenges for the application of safeguards ✓ Cooperation for the establishment of the framework of safeguards and the development of safeguards technology 	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>		<input type="radio"/> <input type="radio"/>
Efforts to secure transparency of peaceful use of nuclear energy	<ul style="list-style-type: none"> ✓ Adoption of nuclear energy policy and its public disclosure by the Atomic Energy Commission ✓ Disclosure of the process towards the revision of nuclear energy policy and the participation of general public in the process ✓ Review of the implementation of nuclear energy policy and nuclear non-proliferation policy ✓ Participation in the discussion for the establishment of international regime for plutonium use ✓ Disclosure of the information on the current plutonium use and on future utilization plan 		<input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
Measures to ensure nuclear nonproliferation in nuclear facilities which process sensitive nuclear material	<ul style="list-style-type: none"> ✓ Deployment of proliferation resistant nuclear technology ✓ Cooperation on the conversion of the core of research reactor from high enriched uranium use to low enriched uranium use and the return shipment of high enriched uranium 		<input type="radio"/>	<input type="radio"/>
Export control and control of sensitive nuclear technology	<ul style="list-style-type: none"> ✓ Export control in accordance with NSG Guidelines ✓ Participation in other international framework for export control and counter-proliferation efforts ✓ Efforts to ensure control of sensitive nuclear technology within the relevant organizations* 	<input type="radio"/> <input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Physical protection and nuclear security	<ul style="list-style-type: none"> ✓ Ratification of CPPNM ✓ Ratification of International Convention for the Suppression of Acts of Nuclear Terrorism ✓ Application of measures in accordance with the latest version of INFCIRC225 ✓ Participation in other international efforts for nuclear security 	<input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/>	

A: Necessary items regardless of the existence of nuclear activities

B: Items which accompany nuclear activities,

C: Items which accompany nuclear fuel cycle activities

* If sensitive nuclear technology is defined as the technology related to enrichment, reprocessing and production of heavy water, this item is categorized as C while if the term is defined more broadly to include the technologies related to nuclear reactors and nuclear fuel fabrication, this item is categorized as B.



Report of this Policy Research



Full version of the report will be available at JAEA website

http://www.jaea.go.jp/04/np/index_en.html

Any questions or comments would be highly appreciated.

Please contact us at npstc@jaea.go.jp.

History of Japan's effort to win the trust for the peaceful nature of nuclear energy use and essential elements

History of global nuclear non-proliferation		History of developments in the field of peaceful use of nuclear energy in Japan	Japan's efforts to ensure nuclear non-proliferation (1)			
Periods	Major events		Legislative measures to ensure peaceful use of nuclear energy	Commitments and cooperation for international regime for nuclear non-proliferation	Safeguards	
					Application of safeguards to Japan	Contribution to IAEA safeguards
Start of the peaceful use of nuclear energy (1953-1974)	"Atoms for Peace" speech (1953) Adoption of NPT(1968) Entry into force of NPT (1970) Indian Nuclear Test (1974)	Criticality of first research reactor (1957) Start of the generation of electricity by nuclear power (1963) 5 NPPs (1970)	Atomic Energy Basic Law (1955) Limitation to peaceful use Law for the Regulations of Nuclear Source Material, Nuclear Fuel Material and Reactors (Regulation law) (1957) Peaceful use pledge and practical measures to ensure the pledge well in advance of ratification of NPT	Japan-US Agreement (1955-) Japan-UK Agreement (1958-) Japan-Canada Agreement (1959-) Introduction of the "regulation on international controlled material" (1961) Signature of NPT (1970) Japan-France Agreement, Japan-Australia Agreement (1972-)	Safeguards based on bilateral agreements (1955-) Transfer of safeguards to IAEA (1963) Incorporation into the domestic legislation of the regulation through bilateral nuclear cooperation agreement	First case of application of IAEA safeguards (JRR-3) (1959) Participation in IAEA Safeguards Committee (1970-72)
Enhancement of the global nuclear non-proliferation regime caused by the concern of diversion of peaceful use of nuclear energy for the military purpose (1975-1980)	Establishment of NSG (1975) INFCIRC225 (1975) INFCE (1977-80) RERTR (1978-) Adoption of Convention on Physical Protection of Nuclear Material (CPPNM) (1979)	Criticality of Fast Reactor "Joyo" (1977) Start of the operation of Tokai Reprocessing Plant (1977) Criticality of ATR "Fugen" (1978) Start of the operation of pilot enrichment plant (1979) 23 NPPs (1980)	Continuation of the peaceful use only policy for half a century	Ratification of NPT(1976) Commitment of peaceful use as an international obligation	Japan-IAEA Comprehensive Safeguards Agreement and the amendment of Regulation Law to incorporate the Agreement (1977) Deliberation of safeguards applied to Tokai Reprocessing Plant (TRP)	TASTEX (1978-81)
Stagnation of peaceful use of nuclear energy and the eased concern for nuclear proliferation (1981-1990)	Entry into force of CPPNM (1987) Increased concern about nuclear safety (Chernobyl accident (1986))	Transportaton of recovered plutonium for JOYO from France to Japan (1984) Start of the operation of prototype enrichment plant (1989) 41 NPPs (1990)		Japan-China Agreement (1985-) Amendment of Japan-U.S. Agreement (1988) Advanced consent programmatic	Incorporation of test result using actual plants	HSP (1980-82) Support to IAEA on the development of safeguards technology through JASPAS* (1981-)
Enhancement of the global nuclear non-proliferation regime caused by the concern of the undeclared nuclear activities (1991-2000)	Collapse of the Soviet Union (1991) Undeclared nuclear activities by Iraq (1991) ⇒ Strengthening of safeguards (93+2) Enhancement of NSG guidelines (1992) Adoption of CTBT (1996) Adoption of Additional Protocol (1997) Nuclear test by India and Pakistan (1998)	Transportaton of recovered plutonium for Monu from France to Japan (1993) Start of the construction of Rokkasho Reprocessing Plant (RRP) (1993) Criticality of FBR "Monju" (1994) Sodium leakage accident of Monju (1995) Fire and Explosion accident at bituminization facility of PNC Tokai (1997) JCO Criticality accident (1999)		Ratification of CTBT(1997) Development of CTBT National Operation System	Hold-up in Plutonium Fuel Production Facility (1994-1996) First ratification among states which operate NPPs. Eighth in total	LASCAR (1988-92) ITAP (1992~98) Contribution of the development of IAEA safeguards framework (Important role in SAGSI since 1975)
Enhancement of global nuclear non-proliferation regime due to the increased concern about the risk of nuclear terrorism and the nuclear proliferation by non-state actors (2000~)	9.11 terrorist attack (2001) PSI (2003) UNSC 1540 (2004) Adoption of International Convention for the Suppression of Acts of Nuclear Terrorism and Amendment of CPPNM (2005) Global initiative to combat nuclear terrorism (2006)	Start of final commissioning test of RRP (2006) Start of the use of MOX fuel in LWRs on commercial scale (2009)		Efforts for the early entry into force of CTBT Japan- EURATOM Agreement (2006-) Japan -Russia Agreement (signed in 2009, not in force) Japan-Kazakhstan Agreement (signed in 2010, not in force)	Diplomatic efforts for the universal adherence to Additional Protocol Shipper receiver difference (SRD) in TRP (-2003) Phased introduction of integrated safeguards (2004-) First application of integrated safeguards among the states which have deployed NPPs on a large scale	Participation in 93+2 (1993~1995) and Committee24 (1996-1997) Efforts to overcome safeguards challenges in cooperation with IAEA *JASPAS • Assignment of cost-free experts • Support for the improvement of safeguards methods and technology for nuclear facilities

Essential elements
<ul style="list-style-type: none"> • Pledge for the limitation of the nuclear energy use for peaceful purposes in the domestic law • Legislative measures to ensure this pledge
<ul style="list-style-type: none"> • Commitment not to acquire nuclear explosive devices (NPT) • Commitment not to carry out nuclear explosion (CTBT) • Compliance with bilateral nuclear cooperation agreements • Commitments and cooperation for other international efforts, or to international organizations, to ensure nuclear non-proliferation
<ul style="list-style-type: none"> • Ratification of Comprehensive safeguards Agreement • Establishment of SSAC • Ratification of Additional Protocol • Application of integrated safeguards • Compliance with safeguards Agreement • Cooperation with IAEA to address challenges for the application of safeguards • Cooperation for the establishment of the framework of safeguards and the development of safeguards technology

*HSP: Hexapartite Safeguards Project, ITAP: Information Treatment Assistance Programme, JASPAS: Japan Support Programme for Agency Safeguards, LASCAR: Large Scale Reprocessing Plant Safeguards, SAGSI: Standing Advisory Group on Safeguards Implementation, TASTEX: Tokai Advanced Safeguards Technology Exercise

History of global nuclear non-proliferation		History of developments in the field of peaceful use of nuclear energy in Japan	Japan's efforts to ensure nuclear non-proliferation (2)			
Periods	Major events		Efforts to secure transparency of peaceful use of nuclear energy	Measures to ensure nuclear nonproliferation in nuclear facilities which process sensitive nuclear material	Export control and control of sensitive nuclear technology	Physical protection of nuclear materials /nuclear security
Start of the peaceful use of nuclear energy (1953-1974)	"Atoms for Peace" speech (1953) Adoption of NPT(1968) Entry into force of NPT (1970) Indian Nuclear Test (1974)	Criticality of first research reactor (1957) Start of the generation of electricity by nuclear power (1963) <div style="border: 1px solid black; padding: 5px; text-align: center;">5 NPPs (1970)</div>	Adoption of the first "long-term plan" (1956) Establishment of Atomic Energy Commission (1957) <div style="border: 1px solid black; padding: 5px;">Transparency since the early days of peaceful nuclear energy use</div> <div style="border: 1px solid black; padding: 5px;">Conclusion that one can pursue peaceful use of nuclear energy while ensuring nuclear non-proliferation (INFCE)</div>		<div style="border: 1px solid black; padding: 5px;">Risk of nuclear proliferation which accompanies nuclear export has been recognized since early days</div> Decision of Atomic Energy Commission (1962) "Spirit of peaceful use of nuclear energy should be applied to the nuclear export" Participation in Zangger Committee (1971)	
Enhancement of the global nuclear non-proliferation regime caused by the concern of diversion of peaceful use of nuclear energy for the military purpose (1975-1980)	Establishment of NSG (1975) INFCIRC225 (1975) INFCE (1977-80) RERTR (1978-) Adoption of Convention on Physical Protection of Nuclear Material (CPPNM) (1979)	Criticality of Fast Reactor "Joyo" (1977) Start of the operation of Tokai Reprocessing Plant (1977) Criticality of ATR "Fugen" (1978) Start of the operation of pilot enrichment plant (1979) <div style="border: 1px solid black; padding: 5px; text-align: center;">23 NPPs (1980)</div>	Participation in INFCE and IPS (1978-82)	Japan-US negotiation for TRP (1977) ⇒Adoption of U-Pu co-conversion technology	Participation in NSG (1975-)	Deliberation on physical protection in Atomic Energy Commission (1976-1980)
Stagnation of peaceful use of nuclear energy and the eased concern for nuclear proliferation (1981-1990)	Entry into force of CPPNM (1987) • Increased concern about nuclear safety (Chernobyl accident (1986))	Transportaton of recovered plutonium for JOYO from France to Japan (1984) Start of the operation of prototype enrichment plant (1989) <div style="border: 1px solid black; padding: 5px; text-align: center;">41 NPPs (1990)</div>	Further enhancement of transparency caused by expansion of plutonium use and nuclear accidents	Deliberation on the response to RERTR within the Atomic Energy Commission (1978)	<div style="border: 1px solid black; padding: 5px;">Export control in accordance with NSG guidelines</div>	Amendment of Regulation Law (1988)
Enhancement of the global nuclear non-proliferation regime caused by the concern of the undeclared nuclear activities (1991-2000)	Collapse of the Soviet Union (1991) Undeclared nuclear activities by Iraq (1991) ⇒ Strengthening of safeguards (93+2) Enhancement of NSG guidelines (1992) Adoption of CTBT (1996) Adoption of Additional Protocol (1997) Nuclear test by India and Pakistan (1998)	Transportaton of recovered plutonium for Monu from France to Japan (1993) Start of the construction of Rokkasho Reprocessing Plant (RRP) (1993) Criticality of FBR "Monju" (1994) Sodium leakage accident of Monju (1995) Fire and Explosion accident at bituminization facility of PNC Tokai (1997) JCO Criticality accident (1999)	<ul style="list-style-type: none"> Adoption of the principle of not possessing more plutonium than necessary (1991) Publication of the information on management of separated plutonium (1994) Participation in the deliberation toward the adoption of the Guidelines for the Management of Plutonium (1994-1997), and the notification of the amount of plutonium in accordance with the Guidelines (1997-) Disclosure of the process of the adoption of the nuclear policy and the participation of the public in this process (Decision of the Atomic Energy Commission in 1996) 	<div style="border: 1px solid black; padding: 5px;">Conversion of the research reactors with the use of LEU to HEU</div>	<div style="border: 1px solid black; padding: 5px;">Point of contact of NSG (1992-)</div>	<div style="border: 1px solid black; padding: 5px;">Physical protection measures in accordance with INFCIRC225</div>
Enhancement of global nuclear non-proliferation regime due to the increased concern about the risk of nuclear terrorism and the nuclear proliferation by non-state actors (2000~)	9.11 terrorist attack (2001) PSI (2003) UNSC 1540 (2004) Adoption of International Convention for the Suppression of Acts of Nuclear terrorism Amendment of CPPNM 2005) Global initiative to combat nuclear terrorism (2006)	<div style="border: 1px solid black; padding: 5px; text-align: center;">52 NPPs (2000)</div> Start of final commissioning test of RRP (2006) Start of the use of MOX fuel in LWRS on commercial scale (2009)	<ul style="list-style-type: none"> Introduction of the policy review system (2005) Publication of the utilization plan of plutonium recovered at RPP (2006) 	Efforts to develop proliferation resistant nuclear technology applied to next generation nuclear systems	Introduction of catch-all measures (2002) Participation in PSI Amendment of export control legislation to enhance the export of nuclear technology (2009)	<ul style="list-style-type: none"> Amendment of Regulation Law to incorporate the requirement of INFCIRC225Rev.4 (2005) Participation in Global initiative to combat nuclear terrorism (2006) Ratification of International Convention for the Suppression of Acts of Nuclear Terrorism (2007)
Essential elements		<ul style="list-style-type: none"> Adoption of nuclear energy policy and its public disclosure by the Atomic Energy Commission Disclosure of the discussion towards the revision of nuclear energy policy and the participation of the general public in the process Review of the implementation of nuclear energy policy and nuclear non-proliferation policy Participation in the discussion for the establishment of international regime for plutonium use Disclosure of the information on the current plutonium use and on future utilization plan 	<ul style="list-style-type: none"> Deployment of proliferation resistant nuclear technology Cooperation on the conversion of the core of research reactor from high enriched uranium use to low enriched uranium use and the return shipment of high enriched uranium 	<ul style="list-style-type: none"> Export control in accordance with NSG Guidelines Participation in other international framework for export control and counter-proliferation efforts Efforts to ensure control of sensitive nuclear technology within the relevant organizations 	<ul style="list-style-type: none"> Ratification of CPPNM Ratification of International Convention for the Suppression of Acts of Nuclear Terrorism Application of measures in accordance with the latest version of INFCIRC225 Participation in other international efforts for nuclear security 	

* INFCE: International Nuclear Fuel Cycle Evaluation, IPS: International Plutonium Storage, NSG: Nuclear Suppliers Group, PSI: Proliferation Security Initiative, RERTR: Reduced Enrichment for Research and Test Reactors