The Contributions of Manufacturers to Restoring Public Trust in the Nuclear Power Industry

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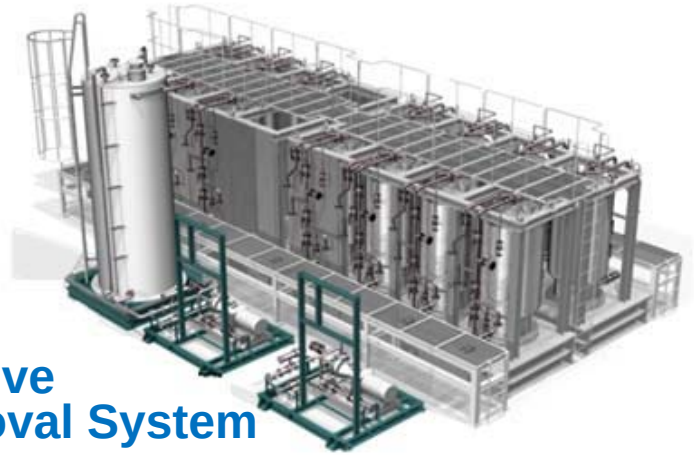
Ensuring Safety

- Emergency measures implemented by setting up 24-hour system with global partners after Fukushima Dai-ichi accident
- Ensured safety by restoring power, cooling reactor core and spent fuel pool, securing cold shut down
- Development of radioactive water treatment system in cooperation with global partners (to remove cesium and salt)
- Established circulating water cooling system to reduce accumulation of radioactive water
- Developed removal system for 62 radioactive nuclides


2011. Photo by Toshiba in


Photo by Toshiba


March 2011.
Photo by Hitachi



Multi Radioactive Nuclides Removal System

Decommissioning

- Removal of fuel in the pool has started and the medium- and long-term decommissioning roadmap advanced to the next step.
- Decommissioning of the Fukushima Daiichi is promoted by TEPCO and the International Research Institute for Nuclear Decommissioning (IRID), which consists of electric companies, national laboratories and manufacturers (Toshiba, Hitachi-GE, Mitsubishi Heavy Industries)
- A variety of R&D and field work for decontamination, debris removal and treatment and disposal of radioactive waste is being carried out in accordance with the medium- and long-term roadmap.

Remote control robots developed for decontamination of Fukushima Dai-ichi
(sponsored by METI)

Safety Improvement & Restart

- Emergency measures against tsunami and earthquake by utilities and manufacturers
- Safety improvements based on new regulatory requirements for restart
  - Safety margin analysis of nuclear plants based on new regulatory requirements
  - Equipment modifications or additions to improve safety
  - Support for Safety Evaluation by Nuclear Regulation Authority

Previous Regulatory Requirement	New Regulatory Requirement	
	Response to Intentional Aircraft Crashes	Measures against Severe Accident
	Measures to Suppress Radioactive Materials Dispersion	
	Measures to Prevent Containment Vessel Failure	
	Measures to Prevent Core Damage(Postulate Multiple Failures)	
	Consideration of Internal Flooding (Newly Introduced)	Reinforced & Newly Introduced
Consideration of Natural Phenomena	Consideration of Natural Phenomena in addition to Earthquakes & Tsunamis-(Volcanic Eruptions, Tornadoes & Forest Fires	
Fire Protection	Fire Protection	
Reliability of Power Supply	Reliability of Power Supply	
Functions of Other SSCs	Function of Other SSCs(Structure, Systems & Component)	
Seismic/Tsunami Resistance	Seismic/Tsunami Resistance	

Safety Improvement and Restart

Voluntary Efforts and Continuous Improvement of Nuclear Safety

- Not only meeting regulatory standards but also exploration of residual risk, even if the probability is low, should be promoted to improve nuclear power plant safety and strengthen accident management. Probabilistic risk assessment (PRA) should be applied.
- Manufacturers will draw on experience in Japan and overseas to cultivate human resources to promote PRA and analysis technology.
- Consider strengthening measures to handle severe accidents and to decrease residual risks, by application of designs, technologies and experience owned by overseas partners.
- Share ownership of information on accidents at nuclear power plants with similar reactor types through the BWR and PWR Owners Group.
- Manufacturers should consider actively proposing safety not only to customers but also to other users, and cooperate in safety improvement. (Measures in the US are instructive)
- From the point of view of defense in depth, manufacturers will apply advanced reactor design and information on accidents to improve measures for handling severe accidents and proposals to improve safety, and contribute to safety improvements in cooperation with government, academia and industry.

Ensuring a Nuclear Culture Grounded in Safety, Quality and Reliability

Continuous Improvement of Integrated Management System

1. Comply with Global Codes and Standards

Global Standard	IAEA GS-R-3,ISO 9001
Domestic Code and Standard	JEAG 4121
U.S. Code and Standard	NRC 10CFR50 App-B,ASME NQA-1,ASME B&PV Code Sec. Ⅲ,Ⅷ
Europe Code and Standard	Finnish Regulatory Guide YVL

2. Set nuclear safety as the highest priority, and establish a Nuclear Safety Cultural Program for continuous improvement

Issue “Basic Policy on Nuclear Safety”, stipulate and apply “Nuclear Safety Cultural Program”, promote education, establish whistle blower hotline, assess employee surveys and feedback

3. Establish a Lessons Learned Program as an information management system, and a Corrective Action Process (CAP)

Monitor conditions and improve processes to avoid major non-conformance

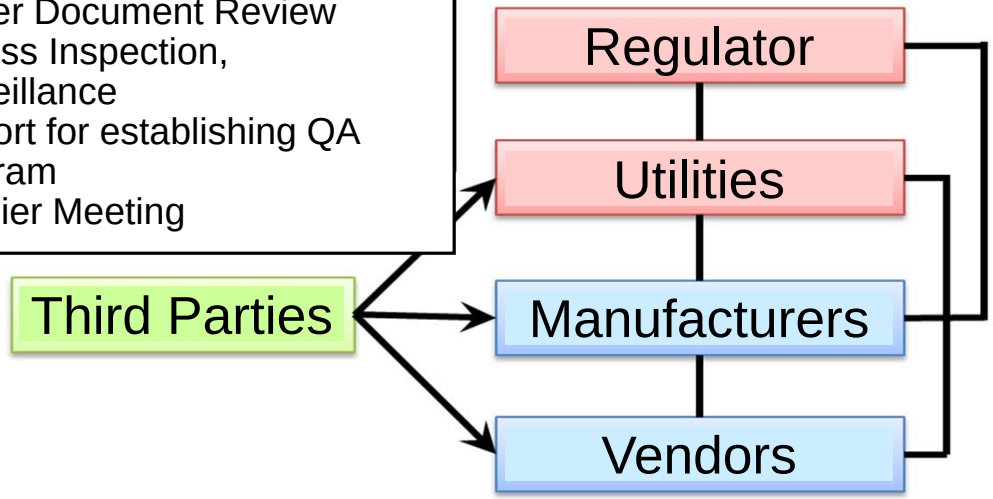
4. Act with “Integrity” and “Accountability” towards all stakeholders

Multiple check system and communication in-house and with third parties

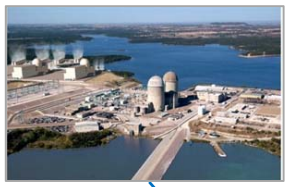
Ensuring a Nuclear Culture Grounded in Safety, Quality and Reliability

Multiple Check System and Communication

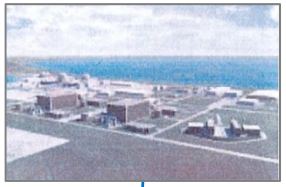
Regulator	Plant Manufacturers
- Pre-operational Inspection - Vender Audit	- Internal Audit - Self-check - Feedback
Electric Power Companies	**Vendors**
- Periodic/Non-periodic Audit - Surveillance - Witness Inspection during manufacture	- Audit for qualification - Design, Procurement, Pre-manufacture Review - Vender Document Review - Witness Inspection, Surveillance - Support for establishing QA Program - Supplier Meeting
Third Parties	
- Surveillance for qualification - Qualification of Special Process - Certification of Personnel - Witness Inspection during manufacture	



Global Deployment of Nuclear Power Plants



Comanche Peak, US
US-APWR
（2 units）



South Texas, US
US-ABWR
（2 units planning）

Wylfa / Oldbury, UK
ABWR
（4-6 units planning）

Olkiluodon, Finland
EU-ABWR, ESBWR,
EU-APWR

Visaginas,
Lithuania
ABWR

Sinop, TR
ATMEA1
（4 units）

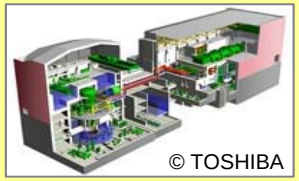
V.C. Summer, US
AP1000 (2 units
under construction)

Vinh Hai, VN

Vogtle, US
AP1000 (2 units
under construction)

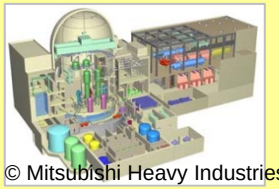
US-ABWR

Advanced Safety Light Water Nuclear Power Plant



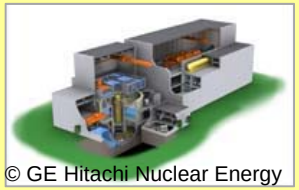
EU-ABWR

AP1000



US/EU-APWR

ATMEA1



ESBWR

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Global Deployment of Nuclear Power Plants

Nuclear Power Plant Exporters' Principles of Conduct

- Vendors adopting these Principles of Conduct will undertake in good faith to implement the best practices described in the six principles
  (Reference: Principles of Conduct initially issued on May 20th, 2011, in Brussels Belgium)

- **Adopters**

  Toshiba, Westinghouse (US), Mitsubishi Heavy Industries, Mitsubishi Nuclear Energy Systems (US), AREVA (France), ATMEA (France), Hitachi GE Nuclear Energy, GE Hitachi (US), Babcock & Wilcox (US), CANDU Energy (Canada), KEPCO (Korea), ROSATOM (Russia)

- **Six Principles**

  1. Safety, Health, and Radiological Protection
  2. Physical Security
  3. Environmental Protection and the Handling of Spent Fuel and Nuclear Waste
  4. Compensation for Nuclear Damage
  5. Nonproliferation and Safeguards
  6. Ethics

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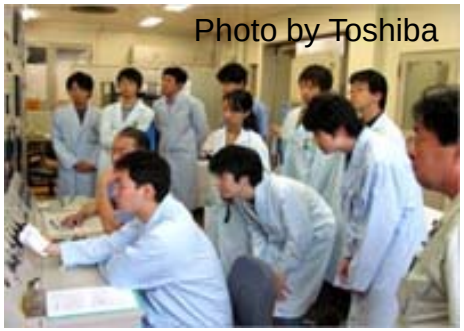
Human Resources (HR) Development

Maintain nuclear technology and develop HR, so as to realize the safety of nuclear power plant and contribute to the global energy supply

- Technology succession by utilizing technology database and IT.
- Technology succession by utilizing individual training programs and training systems.
- Maintain technology in such areas as engineering, inspection or construction through nuclear power construction around the world and O&M in Japan.
- Education programs based on nuclear safety culture.
- Support HR development in countries introducing nuclear plants.
- Developing technologies through the cooperation of government, academia and industry
  - Support for education programs utilizing research reactors or manufacturers' facilities



Training for students

Conclusion

- Although demand and supply of energy resources have changed due to shale gas production, nuclear power is necessary because we need to cope with issues such as energy security and global warming.
- Manufacturers are responsible for satisfying global needs for nuclear power through the provision of safe and reliable nuclear power plants that reflect the lessons learned from the Fukushima Dai-ichi accident.
- All stakeholders in the nuclear industry should promote nuclear safety culture, with leadership from top management, based on giving the highest priority to “Safety and Quality”.

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