



Human Resource Development Looking over Future Deployment of Nuclear Power in Japan

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Presented at the 1st FNCA Panel Meeting of "Study Panel for Cooperation in the Field of Nuclear Energy in Asia", held at Tokyo, Japan, October 30-31, 2007

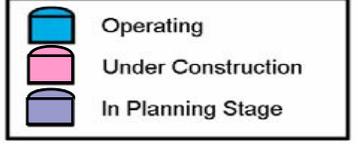
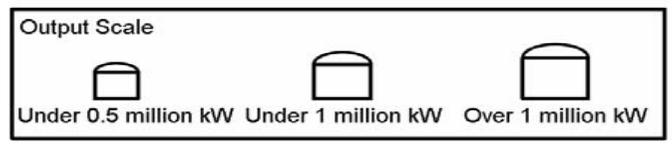
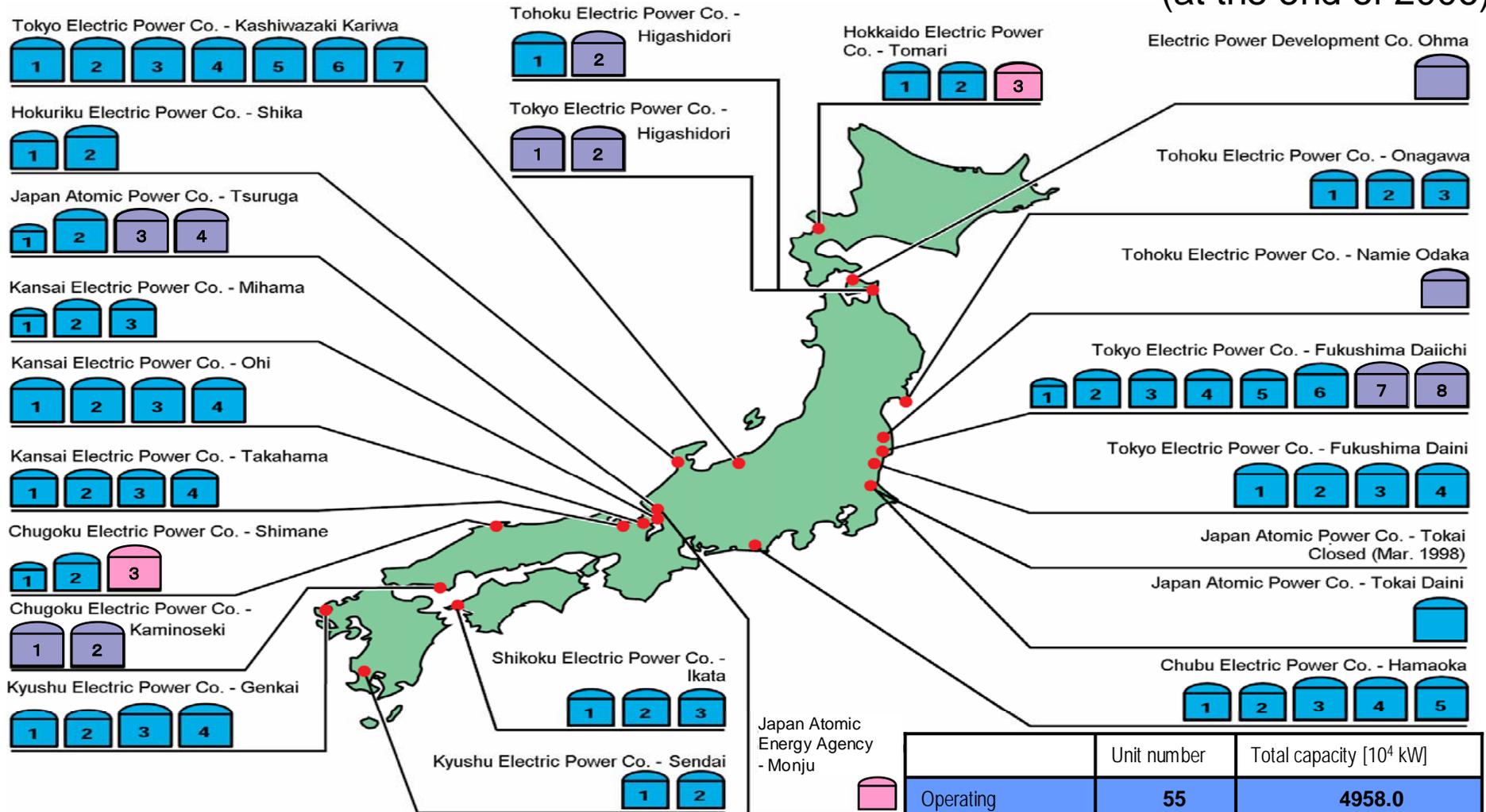


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Status of Nuclear Power Plants in Japan

(at the end of 2006)



	Unit number	Total capacity [10^4 kW]
Operating	55	4958.0
Under construction	3	256.5
In planning stage	11	1494.5
total	69	6709.0

Framework for Nuclear Energy Policy in Japan

The short-term actions

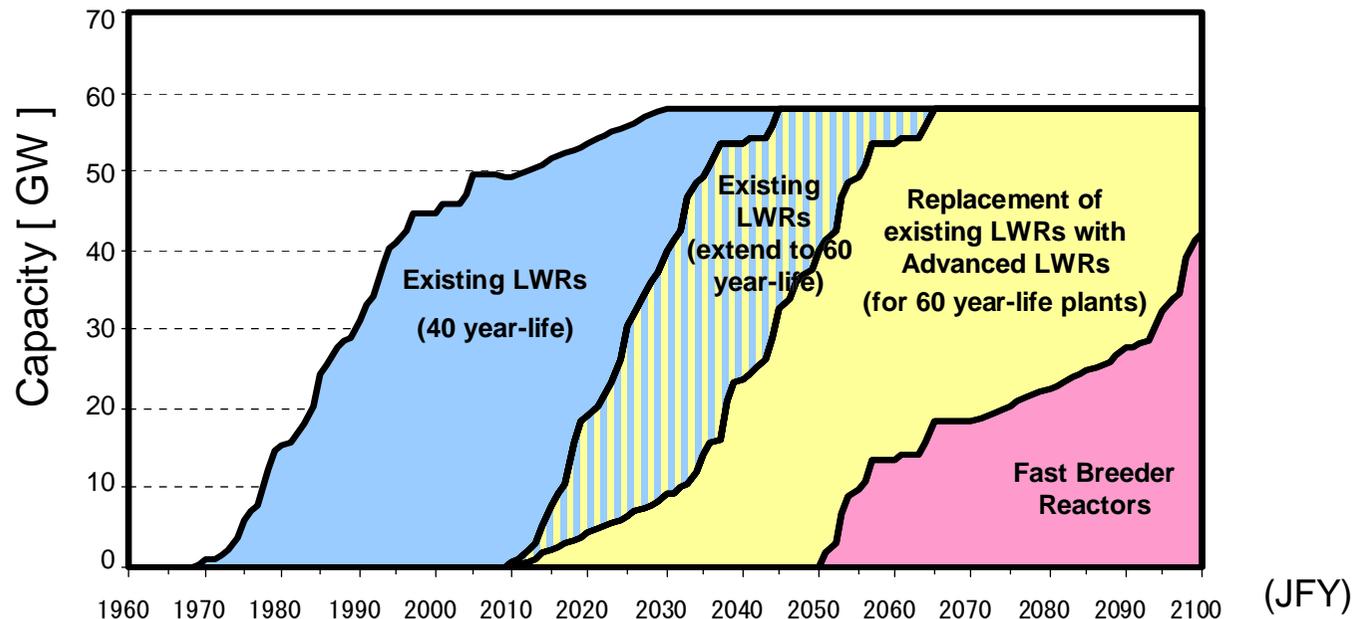
- Use of existing assets as long as practicable with assuring safety
- Use of Pu in LWRs
- Site finding for geological disposal of vitrified high-level waste (HLW).

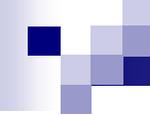
The mid-term actions

- Preparation of advanced LWRs for replacement of retiring plants

The long-term actions

- Development of innovative nuclear energy systems in terms of social acceptability as well as safety, economy and environmental protection including Fusion and ADS.
- Development of fast breeder reactor and its fuel cycle systems, which could be commercially available in 2050s by satisfying the requirements of the safety, reliability, and economy.

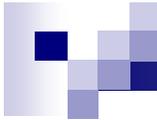




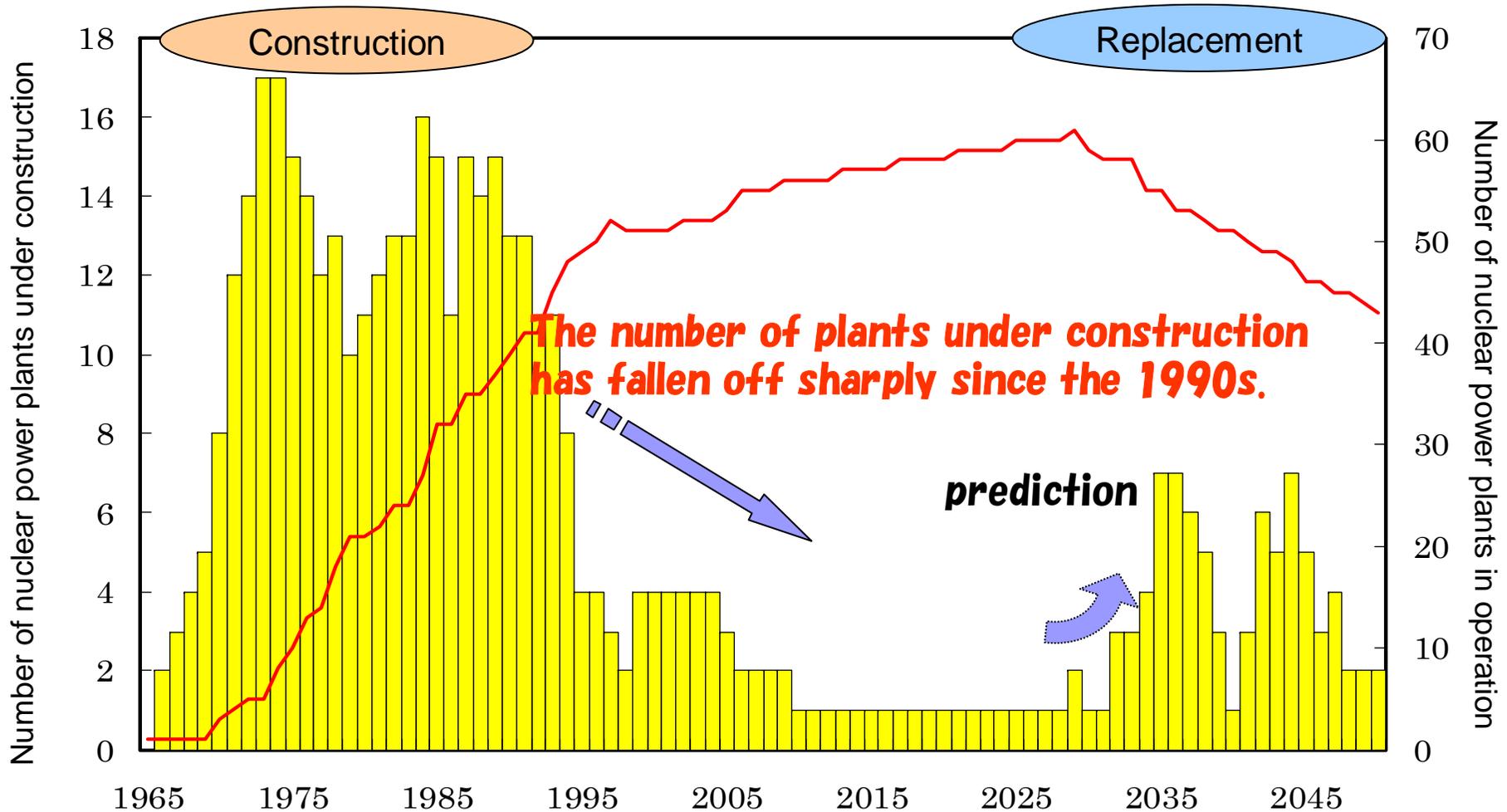
Japan's Nuclear Energy National Plan

The essentials of Japan's "**Nuclear Energy National Plan**" (conducted Aug. 2006)

1. Building new nuclear power plants in a liberalized electricity market.
2. Appropriate use of existing nuclear power plants with assuring safety as a key prerequisite
3. Deploying strategy for acquiring natural resources
4. Promoting nuclear fuel cycle and strategically reinforcing of nuclear industries
5. Early commercialization of FBR cycle.
6. **Assuring ample technical and human resources to support the next generation nuclear power**
7. Supporting for international development of Japan's nuclear industry
8. Positive involvement in creating an international framework to uphold both non-proliferation and the expansion of nuclear power generation
9. Building trust between government and local communities through detailed communication
10. Reinforcement of measures for radioactive waste disposal



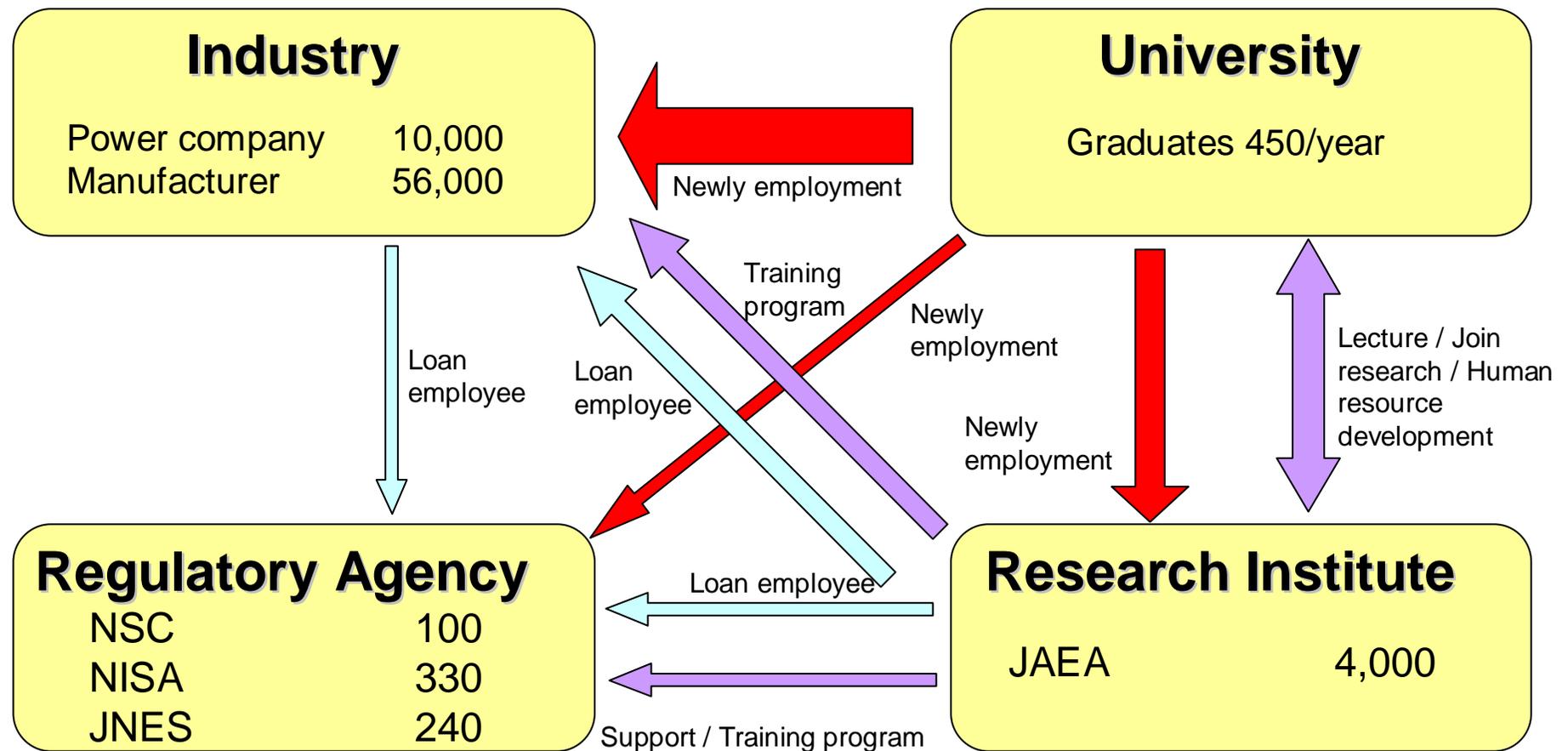
Forecast for number of nuclear power plants



Assumption : Life time is 60 years, and construction period is 4 years after 2010. From 2010 to 2030, new plant with 1.3GWe will be constructed every four years.

2. Human resource development (HRD) in Japan

(unit : person)



NSC : Nuclear Safety Commission in Japan
 NISA : Nuclear Industry and Safety Agency
 JNES : Japan Nuclear Energy Safety Organization

JAEA : Japan Atomic Energy Agency

HRD in Electricity Utility

In Japan, education and training to maintain and improve operating staff capabilities is conducted by the dispatch of staff to training facilities and in-house education at each electricity utility.

Training facilities

Nuclear Power Training Center Ltd. (NTC)

3 PWR simulator

BWR Operator Training Center (BTC)

6 BWR simulator



To the end of FY2005, these training centers provided total of 31,199 individuals and 10,999 teams with training.

Person responsible for operation (shift chief)

(One person) Monitors the whole operation and directs and supervises the operators.

Sub-chief of the shift

(One person) Assists the person responsible for operation and instructs and helps the operators.

Operators

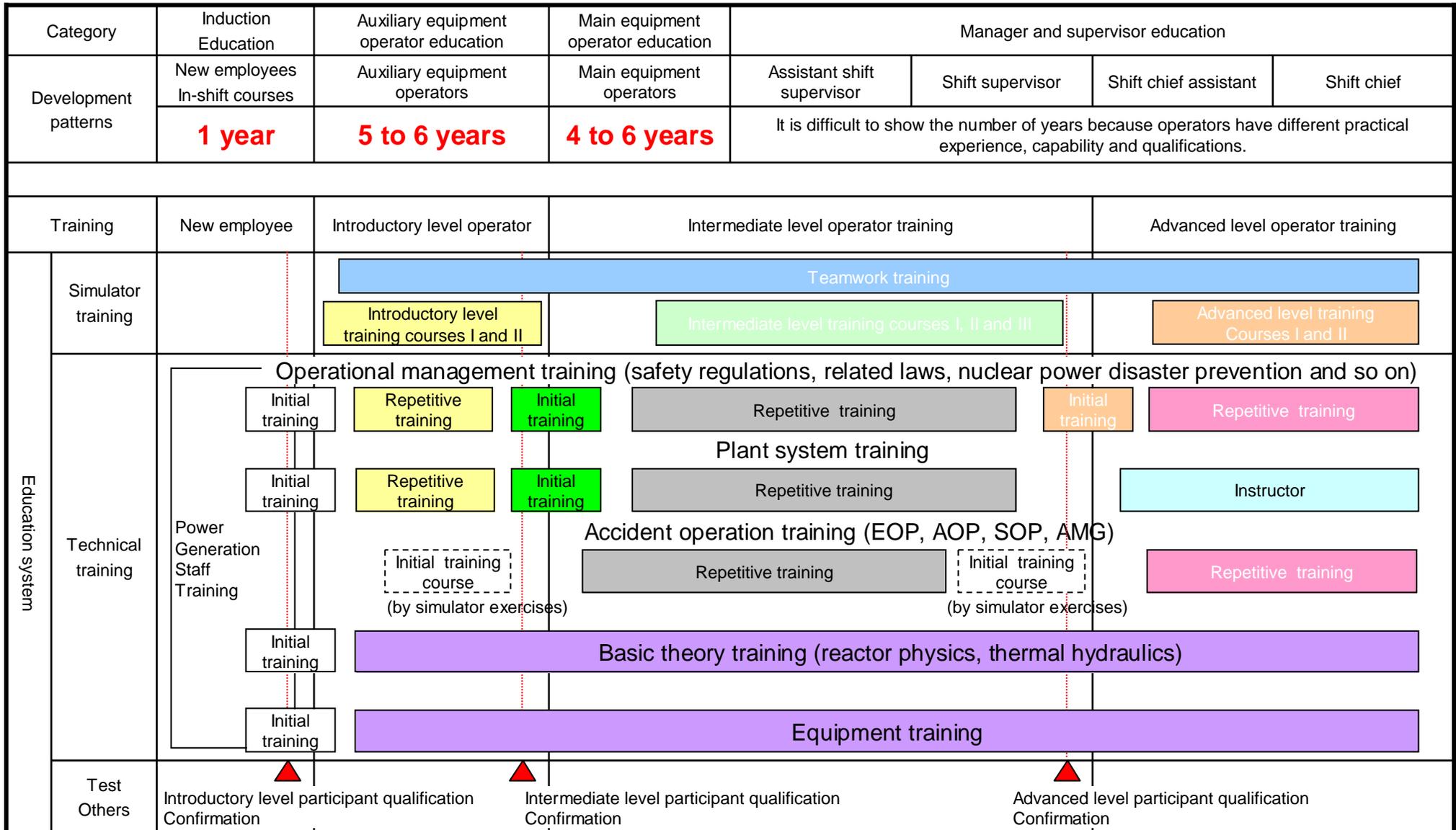
(Multiple person) Monitor and operate the nuclear reactor, turbine and generator.

Assistant operators

(Multiple person) Make the rounds and check of the field and operate auxiliaries.

Power plant operator organization

Long-term Operator Development Plans



HRD in JAEA

JAEA has a mission of HRD for nuclear technology since 1957.

1. Nuclear Technology and Education Center (NuTEC)

- Training project based on the needs from industries, countries, and local communities
- Training for acquisition of qualification approved regally in the nuclear field (Licensed engineer of reactor)
- Cooperation for the Universities of Tokyo (Department of Nuclear) and cooperative university program
- International training in the nuclear field for Indonesia, Thailand, Vietnam, and others.



2. Nuclear Emergency Assistance & Training Center (NEAT)

- Training for nuclear disaster prevention measures training to confirm the group function of off-site center
- Training in the initial motion of accident of which the central role of local government is required



3. International Nuclear Information and Training Center

- Technical training for the fast reactor and maintenance
- Training utilizing Monju simulator equipment



NuTEC Activities in JAEA



Domestic Training

Training in Japan

Nuclear engineers
RI & radiation engineers
National examinee

Training for JAEA staffs

Safety education
Nuclear tech education

Cooperation with IAEA

Safeguards course
ANSN (Asian Nuclear Safety Network)



Collaboration with universities

Univ. of Tokyo
Nuclear professional school
Nuclear engineering and management
Collaboration with grad schools
Nuclear HRD program

International Cooperation

Training in Asian countries
(Indonesia, Thai, Vietnam)
FNCA HRD Project

Response to needs

Lecturers

Trainees

Students

NuTEC /JAEA

Lecturers

Trainees

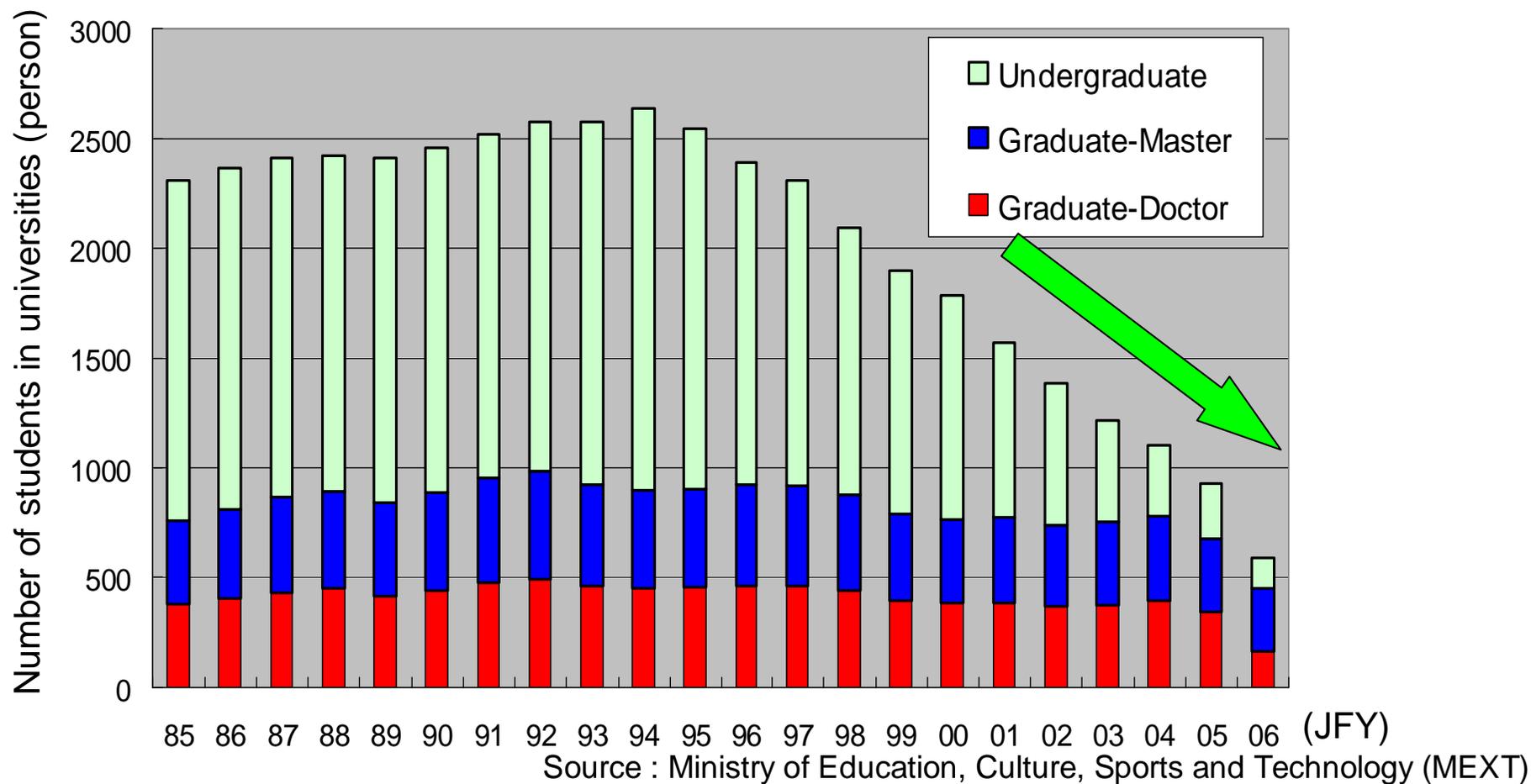
Dispatch of experts
Provision of textbooks

Lecturers



- (1) Nuclear researchers exchange program
- (2) International seminars on nuclear safety
- (3) Instructor training program
- (4) Nuclear safety experts dispatch program

Trend for number of students in nuclear faculty in Japan



The number of students taking nuclear subjects is decreasing !



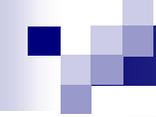
Issues for the HRD in Japan

Concern

- ① With the drop of construction rate of nuclear power reactor, declined the demand for nuclear scientists and engineers in industries, and decreased the number of students in universities years by years, resulting to about half of the peak.
- ② A lot of engineers who have engaged in the construction and operation in '70s and '80s are about to come to their retiring age in 10 years.
- ③ The prediction of nuclear power plants suggests that the demand for nuclear engineers become larger after mid of '20s.

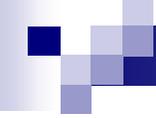
Measure

- ① The MEXT and MITI as a joint project started to support the HRD on nuclear energy in Universities and colleges in 2007.
- ② Fukui University of Technology established Department for the Application of Nuclear Technology in 2005. University of Tokyo, University of Fukui, and Ibaraki University established Graduate School.



Program of Human Resource Development on Nuclear Energy

- Nuclear energy training support program, in which include development course materials, invitation of instructors from industries.
- Funding to basic technology fields underlying nuclear energy such as material corrosion, welding technology, and fluid dynamics, etc., where research activities and specialists are lacking in recent years.
- Sponsorship for students to have opportunities to experience firsthand the realities and appeal of nuclear industry and research laboratories.
- Support of the basic facilities for research & education.
- Developments of core curriculum.



Summary

- In Japan, nuclear energy is an essential energy source. Therefore, HRD required for nuclear energy application has been continued by universities, industries and JAEA.
- Human resource is a unique and fundamental power for using nuclear power in not only developing also developed countries.
- Japan, so far, has made substantial contribution to HRD in FNCA member countries.
- In FNCA member countries, Korea, China, and Japan have power reactors, and a couple of countries are planning to construct power reactors in near future. Other countries may be have power reactors in future.
- It is very important to have a framework share each experience and mutual collaboration in HRD.

Japan will do the best effort for HRD in FNCA member countries.