

# Activities of Council on Nuclear Human Resource Development

FNCA 2009 Workshop on HRD

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# Background of Nuclear HRD in Japan

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## **Circumstances around nuclear energy**

- **Role as a key power source**
  - Contribution to global nuclear renaissance
  - Need for energy security
  - Importance of combating global warming

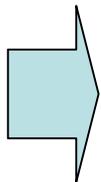
**Expectations for nuclear energy and its role are increasing**

## **Circumstances at universities**

- Engineering-related and nuclear departments are less popular
- Research facilities and equipment are deteriorating
- Systematic technical education has become difficult as a result of re-categorizing departments

**Fewer students wish to major in nuclear-related subjects**

**Education on nuclear subjects is weakening**



**Problems in ensuring and developing good engineers and researchers**

# Activities of Nuclear HRD in Japan

## Nuclear HRD Policy Research Group

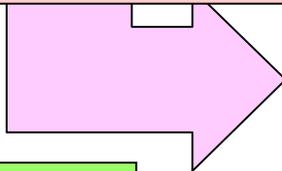
(Secretariat: JAIF)

Investigating the current situation at universities and requests from the nuclear industry; and addressing how human resources can be developed.



Report  
( Mar . 2007 )

Short-term action



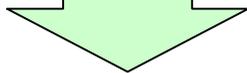
## Nuclear Human Resources Development (HRD) Programs by government

( METI and MEXT )

( April 2007 - )

Supporting human resource development at universities, etc.

Long- & medium-term action



## Council on Nuclear Human Resource Development

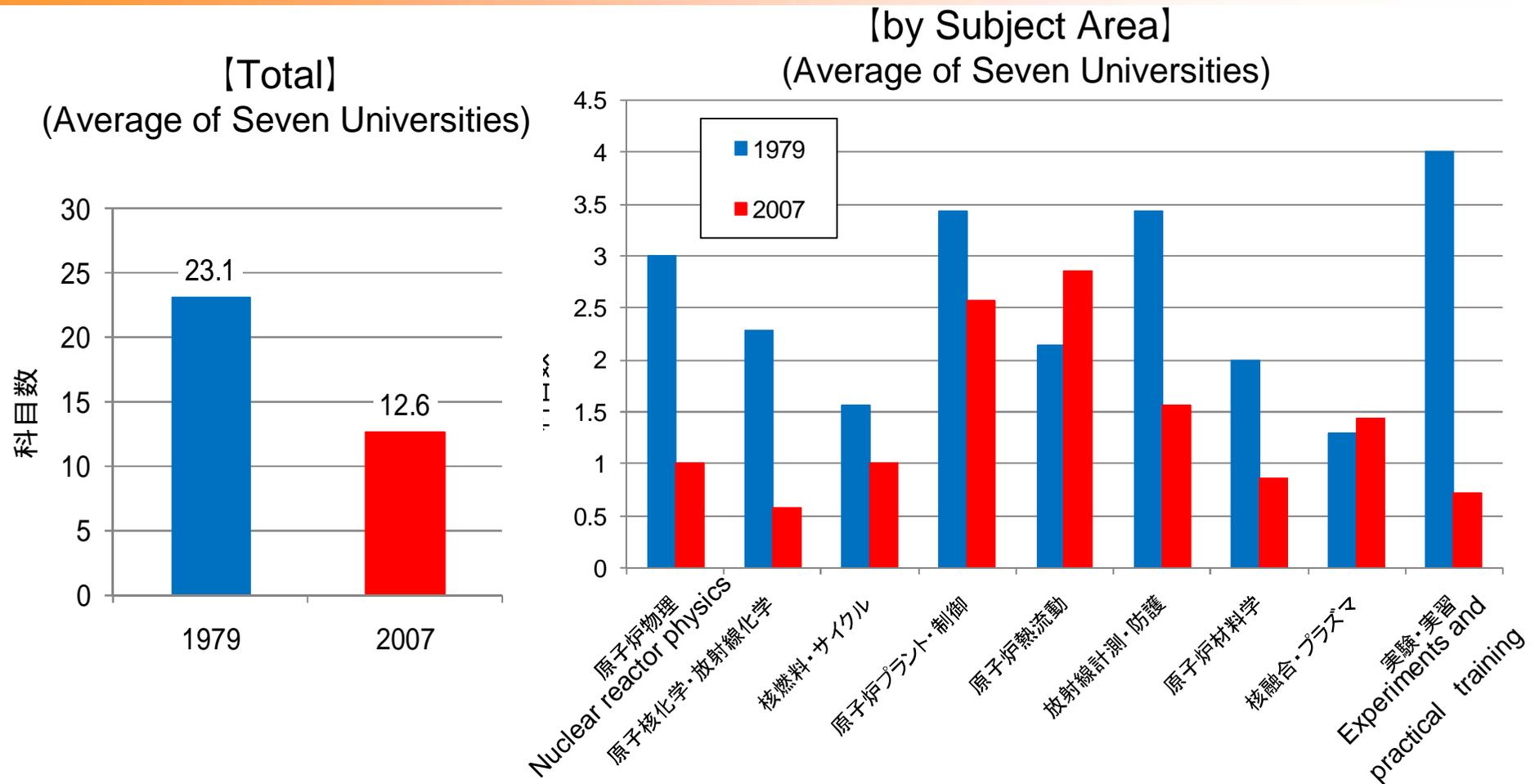
( Secretariat: JAIF )

Performing quantitative analyses of nuclear human resources, and releasing a vision, road map and proposals



Reports  
( Jul . 2008 )  
( Apr . 2009 )

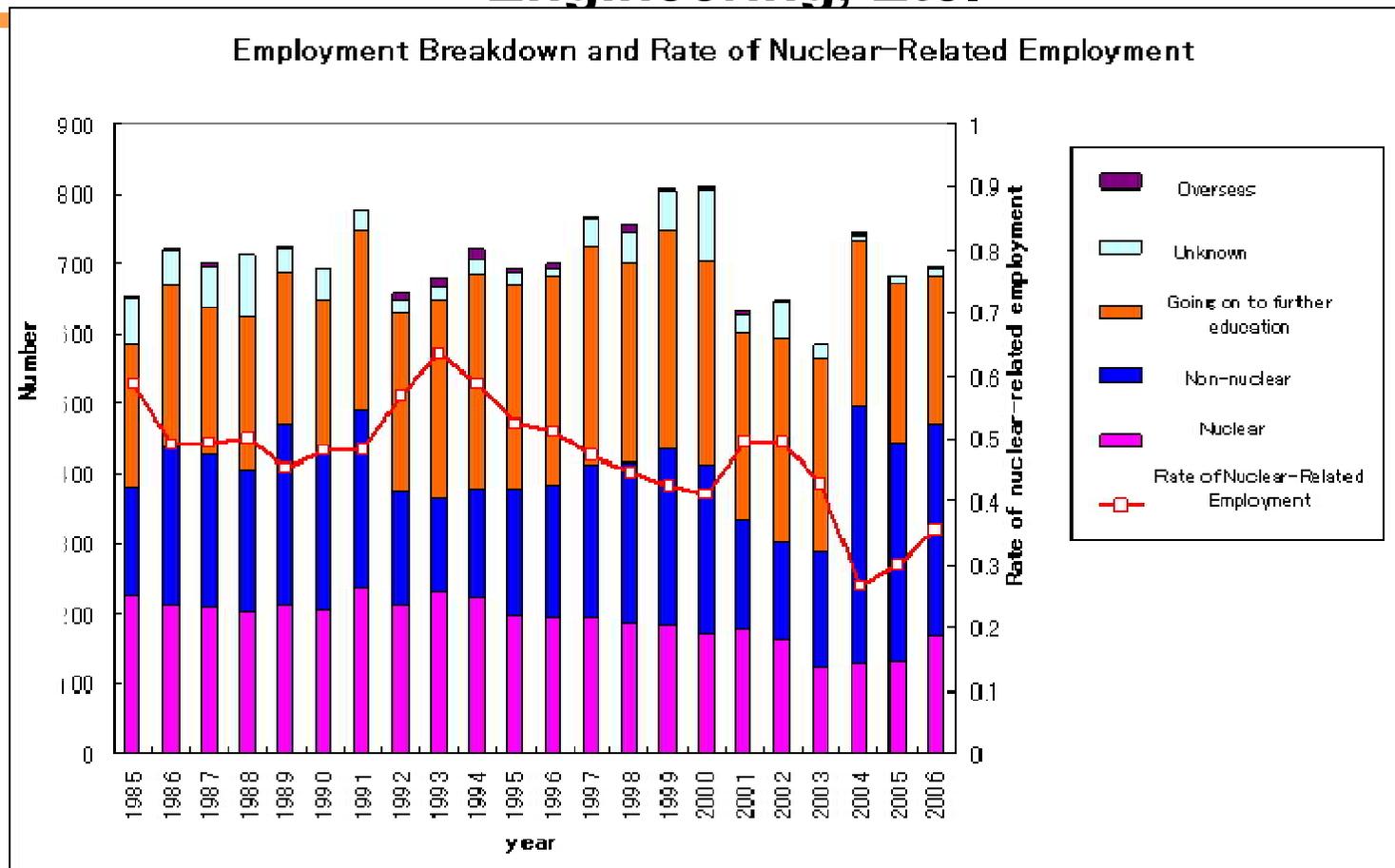
# Number of Nuclear-related Subjects in Nuclear-Related Departments at Universities



- The total number of nuclear-related subjects in nuclear-related departments was reduced by half between 1979 and 2007.
- In the area of nuclear reactor physics, the number fell to one-third. In the area of experiments and practical training, the number fell to one-fifth.

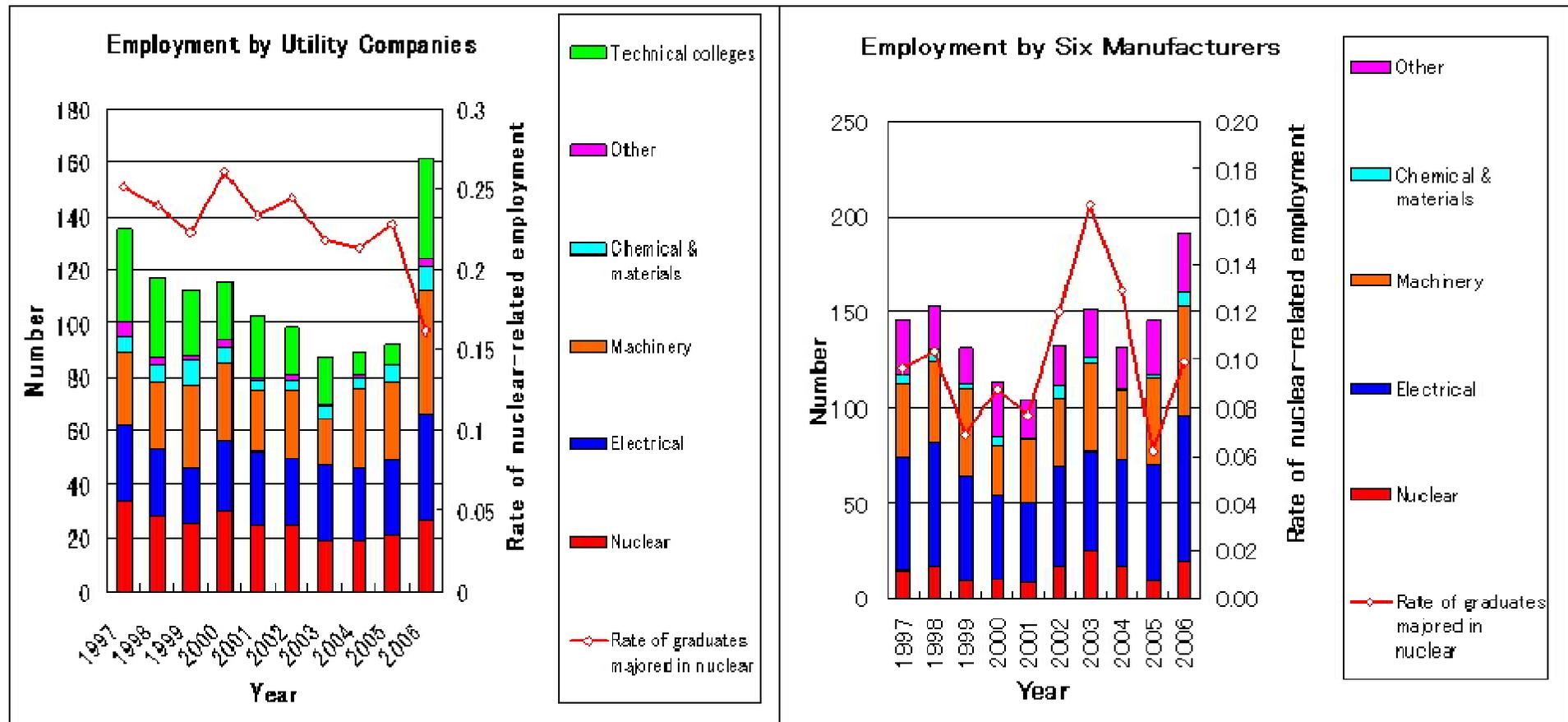
**Education on nuclear subjects is weakening**

# Employment of New Univ. Graduates Majored in Nuclear Engineering, Etc.



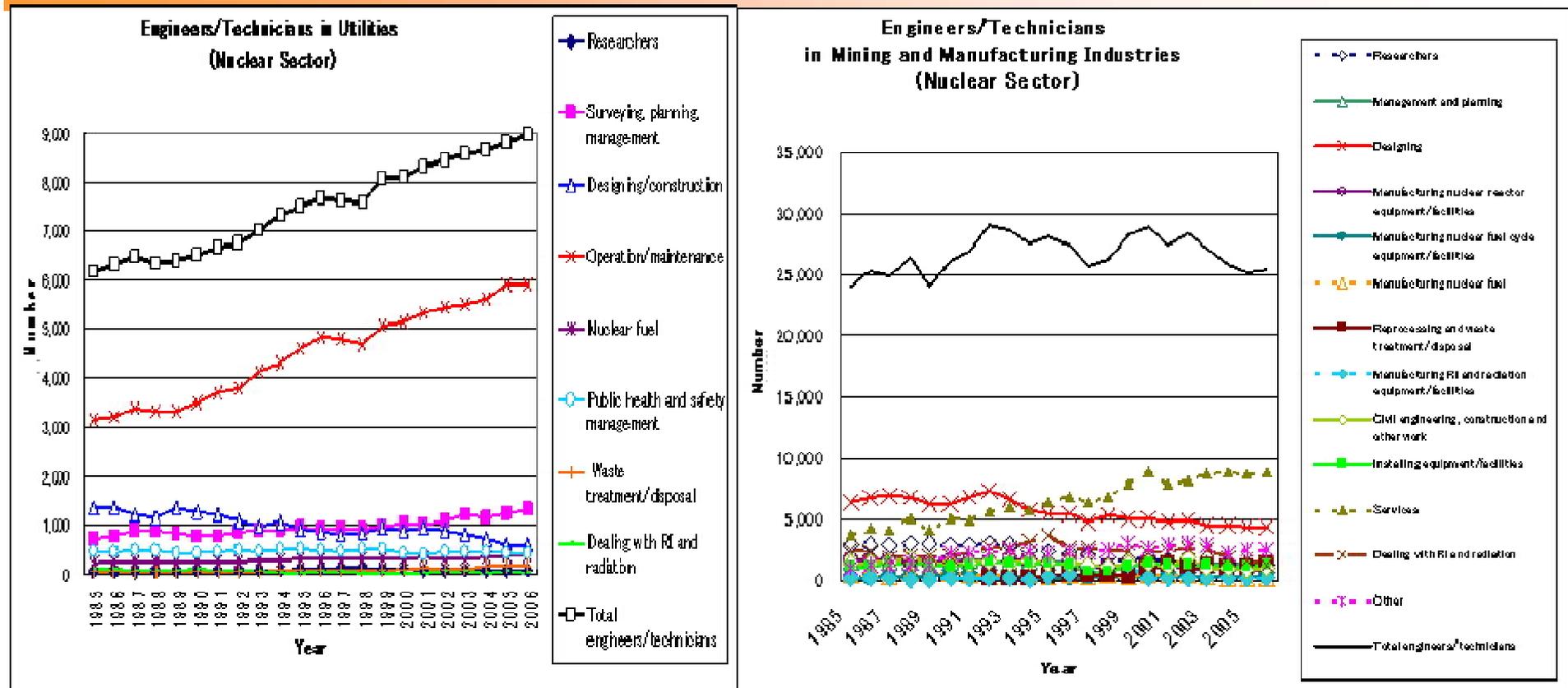
- 700-800 students major in nuclear subjects every year; 200-300 of those go on to further education, and some 500 find employment
- About 40% of the 500 (i.e., 200) are employed by nuclear industry
- 2001- : Data have not been obtainable from some universities due partly to concerns for protecting personal information

# Trend in Number of New Univ. Graduates Employed by the Nuclear Industry



- **11 utility companies:** Around 100 every year; with a clear upturn in 2006; about 20% majored in nuclear or related subjects
- **6 manufacturers** (IHI, Toshiba, Hitachi, Fuji Electric Systems, MHI, Mitsubishi Electric): Around 100-150 every year; with a clear upturn in 2006; about 10% majored in nuclear or related subjects

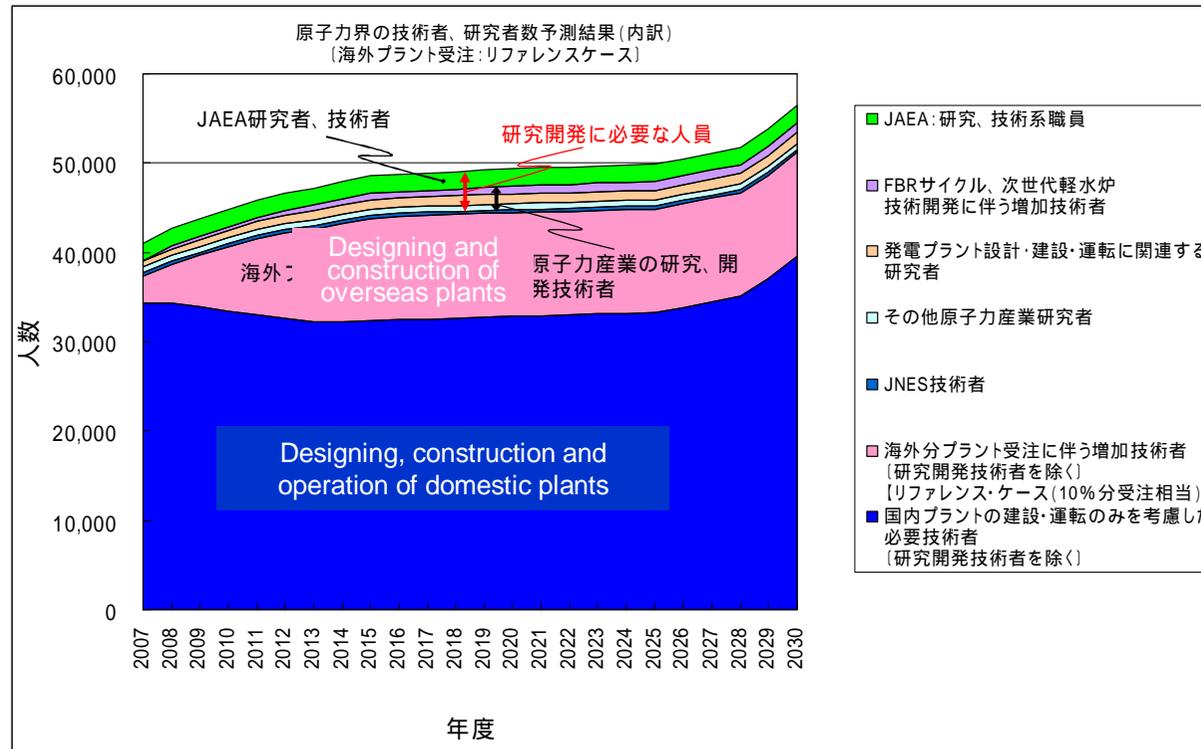
# Trend in Number of Engineers/Technicians Engaged in the Nuclear Industry



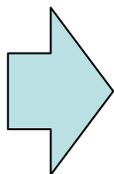
- Total number of engineers/technicians in the nuclear industry was 35,500 (in 2007)
- Utilities: 9,300. Mining/manufacturing industries (including plant manufacturers): about 26,200
- Utilities: Gradually increasing.
  - O&M engineers increasing. due to number of operating plants increased.
- Mining/manufacturing industries (including plant manufacturers):
  - Design sector engineers decreasing. Service sector engineers increasing.

# Results on Quantitative Analyses

## Projected numbers of engineers, technicians and researchers in Japan



\* Assumption: 10% of new plants in the world will be manufactured in Japan



**No immediate quantitative problem is foreseen**  
**The issue is maintaining/improving quality**

# Questionnaire Surveys and Interviews

## Interviews:

Period: December 2007 – March 2008

Subjects: • Educational world	60
• Administration, regulatory, research, etc.	31
• Industrial world	67

## Additional interviews:

Period: August – September 2008

Subjects: The Information Center for Energy and Environment Education, Japan Atomic Energy Relations Organization, Japan Science and Technology Agency, energy- and environmental-education-related parties, etc.

## Questionnaire Surveys to Students and New Employees

Period: August 2008 – January 2009

Subjects: • Students in Nuclear Energy HRD development programs	590
• New employees at research institutes, manufacturing companies and utilities	382

# Major Opinions & Key Points Obtained through Interviews

## Major Opinions

Elementary,  
Junior/Senior  
-High Schools

- Curiosity for science and technology gradually lessens as students advance from elementary to junior and senior high school.
- **The importance of energy/environmental education** has not permeated among teachers.
- Students do not study subjects not included in university entrance exams.

Universities,  
Etc.

- Students don't think much about their ultimate path when they enter school.
- Students not majoring in nuclear-related subjects **tend to be negative about nuclear energy.**

Industries

- **The nuclear industry lacks appeal to those seeking employment.**
- Although the nuclear industry has so far secured sufficient human resources, it is not clear if it will continue to be able to do so.

## Key Points

For young people to aspire to enter the nuclear world, **the nuclear world itself must be appealing.**

In order for nuclear energy to fulfill its assigned role, **human resource development is a fundamental requirement.**

**Understanding and confidence in nuclear energy among the people is the premise.**

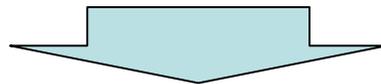
# Results of Questionnaires to Students and New Employees

## Students

- Their interest in nuclear energy grows as they gain professional knowledge.
- Those who desire to study nuclear subjects do so because of the **social contribution, technological challenge, significance of the work**, etc.

## New Employees

- **Many did not study nuclear subjects because there were no such classes.**
- Studying nuclear-related subjects increases interest in nuclear industry.
- The desire to study nuclear subjects is attributable to the social contribution, significance of the work, etc.
- Measures to increase student interest in nuclear subjects are
  - Presenting a picture of nuclear energy as **an appealing career choice.**
  - Teaching nuclear subjects **in elementary and junior/senior high schools.**



## Key Points

- (1) **Nuclear information should be part of elementary and secondary education, as well as being part of university curriculums.**
- (2) **Information on the role of nuclear energy in society should be provided to students and public.**

# Proposals to Activities for Nuclear HRD

**Energy- and environment-related education** should be given at the **elementary and secondary levels.**

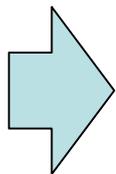
**Attractions of the nuclear world** should be more effectively **conveyed.**

**University education** should incorporate the **needs of the nuclear industry.**

**Young researchers** in the area of fundamental technology should be **encouraged.**

**Internationally minded human resources** should be **developed.**

**Development of human resources** should be **continued after employment.**



**Based on the proposals, HRD activities will be continued in each organization**

# Actions Should be Taken by Major Organizations(1/5)

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## **Government major actions**

- Execution of Nuclear Human Resources Development Programs and continuance of support activities for the education.
- Support for energy and environment education at elementary and junior/senior high schools.
- Efficient utilization of existing educational facilities
- . . . . .
- . . . . .

## **Actions Should be Taken by Major Organizations(2/5)**

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### **Universities Major Actions**

- Education incorporating industry needs.
- Young researchers development in the area of basic engineering/technology.
- Strategic utilization of Nuclear Human Resources Development Programs .
- Strict management of educational curriculums to ensure the ability of master course students.
- Promotion of information exchange with the people.
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- . . . . .

## Actions Should be Taken by Major Organizations(3/5)

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### Industry Major Actions

- Human resources development through “OJT”.
- Promotion of self-development, such as getting qualifications by adding incentive.
- Cooperation and support for schools and universities.  
(dispatch of teachers, internship, technical tour ·····)
- Internationally minded engineers development.  
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## Actions Should be Taken by Major Organizations(4/5)

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### **AESJ (Atomic Energy Society of Japan) Major Actions**

- Research on nuclear curriculums at universities.
- Proposals to curriculums at elementary and junior/senior high schools.
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### **JAIF (Japan Atomic Industrial Forum) Major Actions**

- Continuous execution of Council on Nuclear HRD.
- Holding of recruiting seminars for nuclear industry.
- Support for Japanese participants in WNU (World Nuclear University) .
- . . . . .

## **Actions Should be Taken by Major Organizations(5/5)**

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### **JAEA(Japan Atomic Energy Agency) Major**

#### **Actions by utilizing facilities, experts and expertise**

- Training/seminars for domestic engineers in Japan
- Training/seminars for JAEA engineers/researchers
- Cooperation with graduate schools, universities and colleges with exercises and remote education systems
- International training/seminars for mostly Asian countries
- International cooperation with FNCA, IAEA, CEA/INSTN and ENEN
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# Future Efforts

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Each organization continuously promotes HRD based on the proposals by Council on Nuclear HRD report.

Council on Nuclear HRD actions :

follow up actions conducted by each sector of industry, government and education.

review of remaining items to be investigated.

periodical collection and publication on human resources related data.

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# Thank you for your attention.

For more information,

Please contact at  
[k-ueda@jaif.or.jp](mailto:k-ueda@jaif.or.jp)



# Future Directions for Nuclear HRD

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- 1. Basic understanding of HRD and setting of goals**
- 2. Promotion of understanding, confidence and transfer of attractive features of nuclear**
- 3. Educations in high schools, colleges and universities**
- 4. Human resources development after employment**
- 5. HRD for internationally playing an active role**
- 6. Others (scholarship, evaluation of researchers)**