

## **Preservation of Nuclear Talented Experts in Japan by Cooperation of Industries, Research Institutes and Universities**

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Nuclear power accounts for about 35% electric power generation in Japan, playing an important role of energy supply. In addition, a commercial scale reprocessing plant is under construction. A real nuclear fuel cycle is imminently close at hand in Japan.

COP3 in Kyoto in 1997 called for every country's fight against global warming. Nuclear power in Japan is expected to take another important role from this viewpoint, too.

In order to play these expected roles, it is absolutely needed to preserve nuclear talented experts, by maintaining, succeeding and newly developing nuclear technologies.

The Atomic Energy Commission of Japan also points out in its report on "Long-Term Program for Research, Development and Utilization of Nuclear Energy" that research-and-development activities are very important to motivate young researchers and engineers who might choose to take nuclear careers.

However, young generation capable students seem to avoid majoring nuclear engineering in view of nuclear industry uncertainties in future caused by stagnated Japanese economy since 1990, liberalization of electricity markets, future electricity demand modest forecasts, matured light water reactor technologies, and repeated nuclear accidents inside and outside the country, etc. Aging research facilities at universities are another demotivating element of causing the reduction of qualifiable students. Consequently, preservation of knowledge and expertise is becoming a big concern for future.

According to the survey conducted by the Japan Atomic Industrial Forum (JAIF) over two years since 2002, participated by the members from nuclear industries, universities, research organizations, electricity industries, nuclear plant suppliers and construction contractors, as well as the questionnaire sent to students, there are various issues for preservation of nuclear talented experts in Japan. Although the number of graduates on nuclear engineering is actually about 350 every year, and about 70% of them want to go into nuclear careers, only 1/3 of them can find jobs.

For these reasons, despite the importance of nuclear energy and needs of capable students, fewer students go to the nuclear engineering field due to reduced job opportunities. This in turn has led to the lowered popularity of the nuclear engineering departments in universities.

Industrials have concerns about preservation of their own nuclear expertise under a circumstance of reduced On-the-Job-Training (OJT) opportunities due to fewer plant installation projects.

The JAIF analysis report compiles following proposals:

- 1) To diminish the quantitative and qualitative imbalance between supply and demands of capable human resources;
- 2) To develop new technical fields for the application of nuclear technologies so that researchers and engineers of next generations be attracted; and
- 3) To build up a new network system for nuclear human resources development by education and training through cooperation of universities, research organizations and industries.

The new proposed system in the JAIF report, the Nuclear Educational System network (NES-net), has two main pillars: (i) to share the information on the nuclear human resource development between industries and research organizations; and (ii) to strengthen the graduate school systems jointly operated by universities and research organizations, by sharing expertise resources. The first pillar of constructing the information database about human resource development is underway between the industries and research organizations. Plans of joint operations of graduate courses are also being specified in nuclear engineering by various research organizations and universities.

The Japan Nuclear Cycle Development Institute (JNC) and the Japan Atomic Energy Research Institute (JAERI) will be integrated into one new nuclear research-and-development organization by 2005. Human resources development for future is prescribed as one of the new organization's missions. Cooperation with universities is expected more than ever. JNC has already inaugurated specializing courses such as back-end technology jointly with state-owned universities.

Universities are also under changing circumstances. Being reformed into incorporated administrative agencies, state-run universities are seeking for challenging and attractive research topics to attract capable students. One approach is to operate joint courses with industries or research organizations.

The paper reports other examples of activities for preserving nuclear expertise currently practiced or planned in Japan.