COUNTRY REPORT - Malaysia

FNCA 2009 Workshop on Human Resources Development

22-25 June, 2009, Fukui, Japan

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1.0 INTRODUCTION

The government of Malaysia has identified the human resource development in particular, in the field of science and technology (S&T) as one of the critical factor towards achieving a developed nation. In the Ninth Malaysia Plan (9MP), one of the strategies in the S&T development thrusts towards mastering and harnessing S&T for widespread applications in generating knowledge, innovation and growth is by enhancing S&T human capital as a principal source of innovation and competitive advantage in the country. The Government has set the target to enlarge the pool of researchers to 50 researchers per 10,000 labor force by the year 2010 in the six national priority areas namely biotechnology, advanced materials, advanced manufacturing, ICT, nanotechnology and renewable energy. To meet this target, among of the initiatives of the government are to increase the number of higher learning institutions in the country and introduce the concept of long life learning.

2.0 PRESENT STATUS OF NATIONAL HRD IN SCIENCE AND TECHNOLOGY PROGRAM

The government through the Ministry of Science, Technology and Innovation (MOSTI) has allocated the human resource development fund of RM500 million (approximately: USD143 millions) to upgrade skills and capabilities of S&T manpower in various disciplines for a 2006 – 2010 period through 7 schemes, namely:

- Post Graduate Applied Research Fellowship for in Serving Personnel Scheme

This scheme provides scholarship to researchers in Public Research Institutes and Institutions of Higher Learning to attend further studies at post graduate levels (M.Sc and PhD) in the identified R&D priority areas locally and overseas.

- National Science Fellowship Scheme
  This scheme is a pre-service scholarship for post-graduate full time studies (M.Sc and PhD) based on research in local and overseas institutes.

- Post Doctoral Fellowship Scheme
  This scheme provides support in the form of financial grant to research institutions intending to appoint post-doctoral research fellow (locals or foreigners) to conduct full time research, and thereby contributes towards enhancing and strengthening research in a particular research area of national interest.

- Invitation of Training Expert in R&D Scheme
  Under this scheme, the service of a specialist/consultant/expert can be obtained and entrusted to train researchers or supporting officers in Public Research Institutes and Institutions of Higher Learning

- Overseas Advanced Research Fellowship Scheme
  This scheme provides an opportunity for scientists or researchers in Public Research Institutes and Institutions of Higher Learning to obtain hands-on training through this attachment program at renowned research centers, locally or abroad in identified priority areas, which is relevant to their on-going research work.

- Overseas R&D Management Training Scheme
  This scheme provides opportunities to R&D managers including those who manage R&D policy, R&D project evaluation, Patenting and R&D human capital development to undergo training or short course abroad in renowned research centers with the aim to increase knowledge in managing the local R&D effectively.

- University post Graduate Research Scholarship Scheme
  This scheme is introduced to enhance researchers' capacity within the country by providing scholarship for post-graduate studies to potential scholars

Out of which about more than USD5 million was allocated for human capital development in the areas of Nuclear Science and Technology.

3.0 HUMAN RESOURCE DEVELOPMENT IN NUCLEAR SCIENCE AND TECHNOLOGY (NUCLEAR S&T)

3.1 NUCLEAR MALAYSIA

The development of human resource in nuclear science and technology in Malaysia began since in 1972 with the establishment of Tun Ismail Research Center (PUSPATI), now renamed known as the Malaysian Nuclear Agency with the main aim to promote nuclear science and technology development and application in the various fields, including industry, medicine, agriculture, safety and the environment in the country.

Currently, Nuclear Malaysia has a total of 815 personnel, of which 313 are researchers having tertiary degrees. The figure comprises of 64 with PhD and 90 with Master Degree (MSc) representing 21% and 27% respectively. The remaining 159 personnel with bachelors degree (BSc) qualification are mainly the newly recruited personnel. The recruitment was undertaken in the last five years to ensure that Nuclear Malaysia's knowledge base is sustained when a total of 23 (7%) Nuclear Malaysia's first generation research personnel are expected to retire during the period of 2008 – 2010. The recruitment exercise will continuously be undertaken until the target for 350 researchers is achieved by the year 2010.

Nuclear Malaysia's HRD program emphasizes on the competency and skill development and enhancement at various stage of career development for the research personnel and supporting staff based on the training roadmap. The training roadmap was developed taking into consideration several factors including minimum education and qualification, and the competency and skill required to successfully conduct the R&D as well as technical support services in the various fields including industry, medicine, agriculture, safety and the environment.

Based on the training roadmap, research personnel are required to have a Masters Degree (MSc) as a minimum qualification. At the same time, they are encouraged to enhance their research creativity and strengthen their specializations by furthering their education to a Doctor of Philosophy (PhD) level, especially in areas of emerging nuclear S&T. Currently, there are 55 researchers are still pursuing their postgraduate studies in various fields both locally and internationally. Out of which, 3 are studying in Japan, 2 under the Malaysian Government Scholarships and 1 under the Monbusho Scholarship, Japan.

Nuclear Malaysia's HRD plan also strongly emphasizes on continuous learning and skills upgrading to develop and enhance specialize skilled manpower in the field of nuclear science and technology through various mechanisms including on-job training (OJT), fellowship attachment

at an established laboratory, participating in training courses, seminars, conferences, locally and internationally; guidance through expert assistance and in-house training. In 2008, a total of 181 researchers was trained in various nuclear fields abroad under the national HRD program, IAEA TC, RCA, FNCA/MEXT, JICA and bilateral cooperation.

In addition, as the sole organization entrusted with development and promotion of nuclear science and technology in the country, Nuclear Malaysia's has important role in ensuring that the country has a sustainable supply of qualified and well-trained manpower for various sectors including health, agriculture, industry, manufacturing, safety, environment and energy. In this regards, Nuclear Malaysia offers specialized courses in six different sectors namely:

- Radiation Protection Course
- Non Destructive Testing
- Radiation Safety and Health
- Environmental Safety and Health
- Medical X-ray
- Nuclear Instrumentation

In 2008 a total of 113 courses was conducted involving a total of 2295 participants.

Nuclear Malaysia also acts as a regional center for IAEA Post-Graduate Education Course (PGEC) on radiation protection and safety. The course was established in 2002 for duration of nine months and it is being offered to all RCA and ARASIA member states. To date, Malaysia has provided training to a total of 150 participants.

Nuclear Malaysia also assists local universities in designing the curricula for nuclear related academic program, in addition to providing facilities and supervisions for industrial and practical training of university and college students, and also for undergraduate and post undergraduate research projects. Annually, 150 students undergo their internship in Nuclear Malaysia.

3.2 ATOMIC ENERGY LICENSING BOARD (AELB)

While Nuclear Malaysia's acts as the promoting agency, the regulatory aspects of nuclear technology applications are within the purview of independent regulatory body, the Atomic Energy Licensing Board (AELB) which was established since 1985. Currently, the AELB has 138 personnel comprising of 26 officers at degree level and 102 supporting staffs. AELB's HRD program is developed based on IAEA-TECDOC-1254 – Training the staff of the regulatory body for nuclear facilities and AELB Act 304. The Systematic Approach to Training (SAT) has

been applied and training needs analysis has been carried out. One of the recent initiatives undertaken is the adoption of the AELB Assessor and Inspector Certification Program with the aim to train and certify at least 50 AELB Assessor by 2010.

3.3 NUCLEAR SCIENCE AND TECHNOLOGY PROGRAM IN HIGHER LEARNING INSTITUTIONS

In order to support the development of human resource in nuclear science and technology applications, academic program were initiated at local universities, starting with the establishment of the Nuclear Science Department at University National Malaysia in 1978, where specific nuclear science degrees at both undergraduate and post graduate levels are offered. The UKM Nuclear Science Department has an annual enrolment of between 40 to 50 undergraduate students. These are the only courses that specifically offer nuclear science degrees in Malaysia. While other local universities offer undergraduate and postgraduate in other fields with some aspects of nuclear technology included in their curricula. However, most of these courses are more focused on nuclear applications in medicine, biology and agriculture, with limited emphasis on other fields, such as industry, and especially on nuclear power generation. Programs related to nuclear science and technology conducted by Universities in Malaysia is shown in Table 1.

Table 1: Programs Related to Nuclear Science and Technology conducted by Universities in Malaysia.

University	Degree Level	Program Conducted
UKM	Undergraduate and Postgraduate Postgraduate	Nuclear Science Program Diagnostic Imaging and Radiotherapy Master of medicine (radiology)
UM	Undergraduate Postgraduate	Bachelor of Biomedical (BBMedSc) course module include Nuclear Medicine Technology Medical Physics
USM	Undergraduate Postgraduate Undergraduate Postgraduate	Medical physic - Bachelor of applied science Medical Physic – Master of Science (coursework) Medical radiation program Master of medical (Radiology)
UPM	Postgraduate	Research area – applied radiation (radiation synthesis, medical physics)
UTM	Undergraduate	Basic Nuclear Technology and Application of Radioisotope and Radiation – Major subject in 3th year Health Physics
UiTM	Undergraduate	Basic Nuclear Technology and Application of Radioisotope and Radiation – Major subject in 3th year

4.0 PROGRESS AND IMPLEMENTATION PLAN OF ANTEP

The progress and implementation plan of ANTEP are shown in Annex 1.

5.0 INTRODUCTION OF NUCLEAR POWER

The Malaysian government has recently made announcements to consider nuclear power option to be in its energy mix to ensure a stable source of power and to reduce carbon dioxide emissions which cause climate change. Even though, a policy decision for having nuclear power has not been made, the government, however, has given directives to start laying the groundwork for nuclear power by developing the necessary human resources. According to the study carried by utility company (TNB) on national energy needs, Malaysia will have her first nuclear power by the year 2030.

In this regards, the education and training of nuclear engineers with M.S. and Ph.D in nuclear engineering would be an important priority, besides, the public information. To date Nuclear Malaysia has sent 3 officers to abroad to pursue MSc in Nuclear Engineering while the utility company has sent 2 engineers to abroad to pursue MSc in Nuclear Engineering. In addition, Nuclear Malaysia has conducted 2 Inter-Agency Familiarization Workshops on Nuclear Power Policy and Program Planning, and Public Talk on Nuclear Power Awareness. While the TNB has established an MoU with KEPCO to undertake a Pre-feasibility Study on the Establishment of First NPP in the country, and AELB with BAPETEN, Indonesia on regulatory aspects.

In order to support the NPP Program, two local universities namely UTM and UniTen plan to establish a Faculty on Nuclear Technology Engineering to help ensure sustainable supply of qualified human resource for NPP in the country. UKM has also established an MoU with Korean Advanced Institutes of Science and Technology (KAIST) on Nuclear Power Science and Engineering for the period 2009 – 2010. Under this MoU, for the first time Malaysia hosted the 1st International Summer School on Nuclear Power Science and Engineering which be held from 25 May- 5 June 2009 at UKM. The aim of this summer school is to provide a better understanding of the latest knowledge of nuclear power science and engineering including nuclear reactor engineering; foundation of nuclear reactor theory related with neutron reaction, nuclear fission and chain reactions; concepts and principles of heat and mass transport phenomena and system control in nuclear power plant. A total of 50 participants from Nuclear Agency, AELB, Utility Company (TNB) and universities was attended with the assistance of 4 lectures from KAIST. The UKM is also in the process of preparing an MoU with TU Delft University, Netherland in the field of Nuclear Power Science and Engineering.

Nuclear Malaysia is receiving a team of experts under the IAEA Expert Program in early July 2009, to assist Malaysia to review the national program for Education and training in both non-power and power, with the objectives to identify gaps and additional needs in the E&T program to support NPP development based on International standard.

6.0 CONCLUSION

In view of the needs to speed up the preparation of nuclear power planning, Malaysia is continuously seeking opportunities to develop competent and skilled manpower through international and bilateral cooperation. In this regards, international cooperation such as FNCA, IAEA and countries with established nuclear power programs like Japan, Korea and China have important roles in providing assistance. To complement the efforts made by the NPP countries, Malaysia is allocating certain amount of funding to sponsor our staff for the training in their countries and invite experts from FNCA countries for conducting courses in Malaysia.