Post-FISA 2009 Workshop
organized by the European Nuclear Education Network Association
"Integration of nuclear education and training:
common needs, EU vision and implementation instruments"
Prague, Czech Republic, 25 June 2009 at 9-16h

Summary note by the Secretariat

The Workshop was attended by 50 participants (see Annex I).

Session1 NUCLEAR TRAINING IN THE EUROPEAN UNION

1.1 Introduction to the incentives and the spirit of European Fission Training Schemes (EFTS)
George Van Goethem, European Commission

Georges Van Goethem sketched the framework for the EFTS referring to
- the 5 chapters for cooperation: Innovative systems (GEN IV), Current and Evolutionary Systems GEN-II and GEN-III, Radiation Protection, Waste Management and Disposal and Education and Training (E&T) access to large nuclear infrastructures;
- the documents and surveys on E&T, IAEA, OECD, EU Council (very important);
- the 6 categories of stakeholders: universities, research centres, industry, regulators, international organisations, political decision makers;
- the nuclear E&T networks in the EU countries and others
- the international networks outside Europe, World Nuclear University, Asian Network for Education in Nuclear Technologies, emerging Latin America Network.

1.2 Expectations of the future employers from the EFTS projects

1.2.1 ENEN III Christian Schoenfelder, Areva
AREVA is constructing 4 EPRs simultaneously (China, France, Finland) and expects a large increase in orders and the corresponding need for an increase in qualified workforce, facing the simultaneous construction of 10 EPRs in the near future. There is no recruitment capability from universities and no time to wait for a market driven increased number of MSc in nuclear disciplines. ENEN-III should provide a faster way to educate, train and qualify staff in the four profiles addressed: systems engineer, safety engineer, heating ventilation and air conditioning (HVAC) engineer and instrumentation and control (I&C) engineer. Competences should be certified, documented in a training passport, recognised by regulators and industry and mobility should be ensured. The ENEN-III objectives, structure and work plan was briefly presented. AREVA intends to support 24 staff in the project and 16 internships. The importance was stressed to include in the EFTS also sessions to get acquainted with the employer environment, the professional counterparts and the company culture and policies.

1.2.2 ENETRAP II Michèle Coeck, SCKCEN

Many types of employers require radiation protection staff, as well experts (RPE) as officers (RPO). As a typical employer was not available the expectations were presented by the coordinator. The objective is to provide reference standards and good practice guidance for radiation protection workers in all sectors (nuclear energy and applications, medical sector, non-nuclear radiation applications). It includes a course and training sessions' database, providing a quality label and means for assessing the effectiveness of the courses. The expectations are addressing
(1) clarification of terminology, responsibilities, mutual understanding;
(2) harmonisation of qualifications and requirements, confidence building for mutual recognition;
(3) broadening perspectives to transdisciplinary issues such as risk analysis, etc.;

(4) contents fixed to requirements for RPE and RPO and tailored to the needs, covering all levels of relevant white and blue collar workers;
(5) practical aspects such as modularity, E-learning and distance learning, course language, on the job training and student exchange programmes in cooperation with employers.

1.2.3 PETRUS II Marjatta Palmu, Posiva

Geological disposal and underground storage of nuclear waste is still in the research and development phase and actual jobs descriptions with qualification and skills requirements are not yet available. It means that a systematic approach to training (SAT) cannot be performed. There is also a huge difference in scale with respect to the other EFTS. The number of staff to be trained and employed is estimated in the 100's, not in 1000's. The needs for POSIVA for the years 2010-2014 are about 16 people. The expectations of the future employers in PETRUS-II are to establish a critical mass of higher education with top providers in geological disposal. Professional education and training for geological disposal and underground storage of waste should have the staff of the future employers in mind and not focus on the research scientists mainly involved today. There is an expectation for high level training opportunities for current and future personnel organised in an efficient network.

Discussion on Session 1

A question was raised with respect to the participation of Chinese professional in the EFTS. The answer is yes in general for ENEN-III as well as for other projects and other AREVA training programmes.

On inquiries about the perceived rejection of individual project proposals and applications in EU support programmes, a clear answer was given by the EC that Euratom supports collective actions for specific goals rather than uncorrelated applications in diverging directions. Some supporting programmes, e.g. Marie Curie having a low success rate, are not the preferred way to go in comparison with joint projects in cooperation with the industry.

It was confirmed that entries in the training passport will be subject to examinations and tests. As far as required by the job qualifications, the regulators may participate in the examination sessions. For reactor operators, a standard curriculum is the objective, of course with provisions for the different regulatory systems and reactor types in different countries.

Currently the Bologna agreement and the related ECTS system is accepted by 30 countries inside and outside the EU. Moreover it is extended within the ENEN membership through mutual recognition in the framework of a memorandum of understanding with selected universities, for example in the Russian Federation, South Africa and Japan.

A specific question related to the MELODY project received the confirmation that the intention of ENETRAP-II is to merge or involve all the running projects.

Session 2 NUCLEAR EDUCATION IN THE EUROPEAN UNION

2.1 Achievements by the academia with interaction with the future employers

2.1.1 First Experiences with the Joint EPFL-ETHZ Master of Science in Nuclear Engineering
Rakesh Chawla, EPFL

A new joint degree has been established by two Swiss universities in cooperation with the Paul Scherrer Institute for thesis and research work, and for access to nuclear infrastructures. It includes 90 ECTS of which 25 are devoted to thesis work. 12 students are participating to the cycle 2008-2010.

2.1.2 New Master program in nuclear engineering Joseph Safieh, CEA/INSTN

The different Master programmes (Master after Master M1, Master M2, elective courses, etc.) were presented together with a review of the French higher education system involving the grandes écoles, the universities, INSTN, etc. The modules, ECTS and time schedules of the programmes are commented and the available nuclear infrastructure for education and training is presented. A new initiative for a Master of Nuclear Energy by a consortium of industry, universities and INSTN is introduced and will start in September 2009 with more than 100 students.

2.1.3 European Masters degree in Radiation Protection (EMRP)
Jacques Balosso, University Joseph Fourier (UJF) – Grenoble

The development of this Masters degree since 1995 was sketched. Initially based on an IAEA postgraduate course it transformed into ERPC, then ENETRAP-1 and finally EMRP in September 2008. Involving 10 institutions and 70 lecturers the successive programmes educated 200 students in radiation protection with a success rate of 94 %.

2.1.4 Waste Management experience in Education with interaction with the future employers
Marjatta Palmu, Posiva, and Neil Chapman, ITC

The development of ITC since 2003 was sketched starting with the Track programme, which lacked long term vision and focused on ad hoc actions and was not very successful. The organisation of ad hoc courses, based on IAEA training programmes, was more successful. Finally best results were obtained by direct collaboration with waste disposal companies on topical courses with up to 90 participants. There is a need to structure the courses and make the course databank available within the EU. The ITC professional development plan is included in the project PETRUS-II.

2.2 Achievements by the future employers with interaction with the academia

2.2.1 Skills renewal in the Nuclear Industry, an industrialist's point of view
Michel Bonnet, EDF

The strategic priorities of EDF were presented as the framework for the action plan and initiatives taken. They include the safety and continuity of NPPs, the participation in the global development of nuclear power, building 10 EPR's in 10 years, and providing long term support to GENIV research.

The need for new qualified and skilled staff is huge: about 40% of the current staff is retiring in the next 5 to 7 years with a corresponding need for recruitment of 5000 engineers and 5000 technicians in less than 10 years and, in addition 900 engineers are needed by 2011 for the new projects; recruitment rate is rising rapidly and now at 600 staff per year. About 25 % for operations, including training centres, 13% instrumentation and control, 13% neutronics and fuel safety, and smaller fractions for metallurgy and electromechanics.

The general action plan is strengthening and structuring the curriculum in nuclear engineering, introducing the new Master programme in Nuclear Energy, and supporting post Master professional certifications in selected specialisations, for example EMRP. It includes also the sponsoring of the INSTN GA degree and the creation of the European Foundation for Tomorrow's Energies. Specific actions include the creation of professorships, international collaboration with universities, involvement of 300 EDF staff in teaching and training, availability of full-scope simulators, providing more than 600 student grants every year, etc.

2.2.2 Experience and plan of Areva Christian Schoenfelder, Areva

AREVA's perspectives for recruitment are even more ambitious: of the 60 000 staff about 20 000 will retire in the next few years and 20 000 more will be recruited for the new project, which means 40 000 staff to be recruited and retained in less than 10 years. In addition to the technical qualifications and skills, AREVA also provides the teaching of values and company culture to newcomers, the development of collective working and networking, and addresses the preservation and maintaining of specific AREVA know-how and expertise.

The action plan includes the AREVA two-weeks Campus Cycle which fosters networking, improves understanding and communication, develops safety culture, promotes internal integration and career development, and addresses management training and provides training on relations/interactions with customers and suppliers.

Discussion on Session 2

The question why major industries EDF and AREVA prefer parallel interactions with universities and academia rather than through ENEN was briefly addressed. ENEN should analyse this situation and draw conclusions and take actions to strengthen the contacts.

The structure of the French MSc Nuclear Energy was explained further; the MSc Nuclear Engineering is one of the five options in the MSc Nuclear Energy.

The Swiss situation with 90 ECTS MSc rather than the usual 120 ECTS was reported to be due to historical reasons.

The difficulties in recognising joint degrees in EMRP and the opportunities for internships were discussed. EMRP plans 6 months internship with in-depth exposure to different aspects. Proposals are being collected and further welcomed.

The need for and importance of good teachers, technically and pedagogically competent, was mentioned several times. Responding to the need for teachers deserves the same effort as the attraction of more students and the provision of professional training programmes.

A final item in the discussion was the emphasis given by the industry on the inclusion of safety training and aspects of safety culture in all phases of education and training and the importance of managerial training in addition to technical training.

Session 3 INTERNATIONAL PERSPECTIVES and NETWORKS

3.1 Building International cooperation - Needs and achievements on nuclear E&T

3.1.1 Russia Vladimir V. Artisyuk, CICET

The recent reorganisation of nuclear education and training in the Russian Federation was presented and the objectives, resources and operation of the current networks were described. The Central Institute for Continuing Education and Training has expanded into the International Centre of Nuclear Competence and is managed by the Obninsk Institute for Nuclear Power Engineering. The National Research Nuclear University is a consortium of academia and engineering schools under the leadership of the Moscow Engineering and Physics Institute.

The plans for a close cooperation of both networks with the ENEN Association are presented and a brief description was given of the project proposals currently under evaluation by the EC.

3.1.2 China Xiao Wu, Graduate School of CNNC

The China National Nuclear Corporation presented a detailed overview of the development of the nuclear industry in China, its present status and plans. This was followed by a review of the nuclear education and training institutes and organisations and the nuclear facilities available for this purpose. Further the China Institute of Atomic Energy, its resources, faculties and curricula were presented. Finally a proposal for international exchange and cooperation was introduced and commented.

3.1.3 United States Gilbert J. Brown, University of Massachusetts Lowell

G. Brown presented a historical and evolutionary review of nuclear power over the years since its first use in the early fifties. His entertaining and refreshing narrative with many references and anecdotes was very much appreciated by the participants in the late afternoon session. He correlated the history of nuclear power to the accompanying educational programmes producing more than 4000 nuclear engineers per year at the peak of nuclear power expectations to a less than 600 low in the nineties and now growing rapidly again. Thirty nuclear engineering programmes are offered in the USA and 25 university research reactors can accommodate the practical exercises and training programmes. The States and the industry took the lead in Community College programmes offering a unified industry curriculum, now being followed at the federal level by the DOE and NRC programmes and support.

3.2 IAEA Assistance for the Development of a National Infrastructure for Nuclear Power Thomas Mazour, IAEA

In the final presentation of the afternoon session a clear picture was given of the role and the assistance of the IAEA in the three distinct phases of introducing nuclear power in newcomer countries. The role ranges from a credible and objective counsellor in the feasibility study and the pre-project phase to provide competences to review and advise in the preparatory phase when bids are opened and evaluated. The need for IAEA assistance is less in the third phase, the construction, because all first NPP projects are turnkey realisations, whereby the human resources are managed by the manufacturer. A major component of the assistance of the IAEA is to provide guidance, advice and training on the establishment of the regulatory framework and nuclear safety structures in the newcomer countries.

Discussion on Session 3

The discussion started on the respective advantages of education and training, where it was emphasized that training provides a faster response to specific needs and quickly can fill the gaps of missing expertise and qualifications. Education has a broader scope, has a slower response and its implementation is less flexible with a risk of overestimating the needs and becoming oversized.

Another item raised in the discussion was the need for training in decommissioning and dismantling, which a necessary but less attractive job. EDF, Tecnatom and others expressed their intention to support initiatives and training programmes in this area. It was remembered that decommissioning should be part of the design requirements and be included at the first stages of NPP developments.

Annex I: List of Participants is given at the following pages.

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