

ENEN's Challenges in Response to the Industry and Regulatory Needs

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Résumé

L'association "European Nuclear Education Network" (ENEN) est une association à but non lucratif qui a pour objectif la préservation et le développement de l'expertise dans le domaine nucléaire à travers l'enseignement initial et la formation continue. ENEN soutient ses membres dans l'organisation et la participation à des cours académiques et à des stages de formation et a développé le concept du Master Européen de Science en Ingénierie Nucléaire. En 2009, dans le cadre du 7^e PCRD, trois projets ont démarré avec pour objectifs l'établissement de parcours de formations communes au niveau européen, pour des métiers spécifiques. En décembre 2008, le Conseil de l'Europe a salué l'existence au sein de l'Union Européenne (UE) de la coordination des formations aboutissant aux qualifications dans le domaine nucléaire, réalisée notamment par ENEN, et a exprimé son espoir qu'elle continuera, avec l'aide de l'UE et ses membres, à développer la coordination de la formation dans ce domaine en Europe. ENEN s'efforcera de répondre à ces attentes dans les années à venir.

Abstract

The European Nuclear Education Network (ENEN) Association is a non-profit organization with the objective of the preservation and further development of expertise in the nuclear field by higher education and training. The ENEN has provided support to its Members for the organization of and participation to selected E&T courses in nuclear disciplines and developed the European Master of Science in Nuclear Engineering. In 2009 three European Fission Training Scheme projects started to establish a common certificate for professionals at the European level. In December 2008 the European Council welcomed the existence within the EU of coordinated teaching and training leading to qualifications in the nuclear field, provided notably by the ENEN, and expressed its hope that, with assistance of the EU, the ENEN and its members will continue to develop the coordination of nuclear education and training in Europe. The ENEN endeavours to respond to their expectations in the years to come.

1. Objective and Structure

The "European Nuclear Engineering Network" project was launched under the 5th Framework EC Programme in January 2002. It established the basis for conserving nuclear knowledge and expertise, created a European Higher Education Area for nuclear disciplines, and initiated the implementation of the Bologna declaration in nuclear disciplines [1]. One of the main achievements of this project was the establishment by the partners of the "European Nuclear Education Network (ENEN) Association. The ENEN project was thereby given a more permanent character and a legal status of a non-profit international organization on the 22nd of September 2003 under the French law of 1901 [2].

The main objective of ENEN is the preservation and the further development of expertise in the nuclear field by higher education and training in response to the needs of the sector and to the concerns expressed by international organisations with respect to the future availability of a sufficient number of experts in the nuclear disciplines [3][4].

The ENEN Association has two kinds of members. All members should have a legal status in an EU member

state or a candidate country. The Effective Members, primarily academics, provide high-level scientific education in the nuclear field in combination with research work, and use selective admission criteria. The Associated Members, such as nuclear research centres, industries and regulatory bodies, have a long-term tradition of relations with effective members in the field of research, training or education and are committed to supporting the ENEN Association. As of March 2010, the ENEN Association has members in 18 European countries, consisting of 32 Effective Members and 17 Associated Members. Since 2007, the ENEN Association has concluded a Memorandum of Understanding (MoU) with partners beyond Europe for further cooperation (South Africa, Russian Federation, Japan, etc.)

2. Main Achievements Since 2003

2.1 European Master of Science in Nuclear Engineering

Supported by the 5th and 6th Framework Programme of the European Community, the ENEN Association has

established and continues to monitor the equivalence of nuclear engineering education curricula at the ENEN member universities through its Teaching and Academic Affairs Working Group. As a result, the ENEN developed the European Master of Science in Nuclear Engineering. A reference curriculum, consisting of a core package of courses and optional substitute courses in nuclear disciplines, has been designed and mutually recognized by the ENEN members. To advertise and promote this realization, ENEN has established the qualification of European Master of Science in Nuclear Engineering (EMSNE). For this purpose, ENEN developed by-laws and procedures for handling applications, selecting candidates and awarding the EMSNE certificate. An information leaflet to attract applications for this EMSNE certificate has been designed [5] [6].

A European Master of Science in Nuclear Disciplines will be delivered under ENEN certification in the near future extending ENEN's certification to other disciplines such as radioprotection and waste management and disposal. By-laws have to be established.

2.2 International Exchange Courses, Advanced Courses and Training Seminars

The equivalence of nuclear engineering curricula relies on the mutual recognition of courses among the ENEN member universities. ENEN therefore also has the task of promoting student and faculty exchanges by encouraging and supporting the organization of international exchange courses at Master level, advanced courses at PhD level as well as training courses for young professionals.

A typical example is the Eugene Wigner course, a three-week course on nuclear reactor physics including lectures and practical exercises at three different reactors, which has been organized five times since 2003 by a group of universities and research centres in central Europe, addressing nuclear engineers and young professionals. Joint courses have also been organised on Neutronics for LWRs, Principles of Operation of Nuclear Reactors, and Dismantling Experience of Nuclear Facilities. Advanced courses at PhD level have been organized by ENEN in the framework of the Integrated Project EUROTRANS (<http://www.enen-assoc.org/en/activities/for-universities/eurotrans.html>). Many international training seminars addressing students and professionals have been organised on a regular basis since 2003 in France, Germany, Romania, Finland, etc.

2.3 NEPTUNO (FP6) Deliverables, Database and Communication System2

Other ENEN products related to the implementation of the EMSNE, to exchange courses as well as to training sessions for young professionals are available on the website of the Sixth Framework Programme project – Nuclear European Platform of Training and University Organizations (NEPTUNO, <http://www.sckcen.be/neptuno>). Deliverables of this Coordination Action include guidelines, best practices and do-it-yourself kits for the organization of international ENEN exchange courses, with examples of flyers and application forms [7].

2.4 ENEN II Project (FP6) - Extension to other nuclear disciplines

The ENEN-II Coordination Action consolidates and expands the achievements of the ENEN and the NEPTUNO projects attained by the European Nuclear Education Network Association in respectively the 5th and 6th Framework Programme of the European Commission [8]. The ENEN-II project activities have been mainly structured around the five Working Areas (WA) of the ENEN Association in close collaboration with selected consortium partners. The objective of the ENEN-II project was to develop the ENEN Association in a sustainable way in the areas of nuclear engineering, radioprotection and radwaste management, including underground disposal. The current developments in the 7th Framework show that this has partially been achieved. Indeed, the interaction between the different communities, engineering, radiation protection and waste management, has been considerably strengthened. The ENEN Association experience has been exploited to the benefit of the other communities in the development of their networks and the definition of their education curricula and the training programmes. Although the training projects ENEN-III, PETRUS-II and ENETRAP-II, now running under the 7th Framework Programme, are distinct activities, they have been prepared in mutual consultation by the three communities. The ENEN Association is a partner in the three consortia, assuming a pivotal role in the coordination and streamlining of education and training activities in the European Union.

2.5 Nuclear Fission Training Scheme- ENEN III, PETRUS II and ENETRAP II

The ENEN Association is involved in three projects for European Fission Training Schemes (EFTS) under the 7th Framework Programme of the European Commission, i.e. ENEN III on nuclear engineering, PETRUS II on geological disposal and underground storage of radioactive waste [9], and ENETRAP II on radiation protection [10].

ENEN-III

The project covers the structuring, organization, coordination and implementation of training schemes in cooperation with local, national and international training organizations, to provide training courses and sessions at the required level to professionals in nuclear organizations or their contractors and subcontractors. The training schemes provide a portfolio of courses, training sessions, seminars and workshops, offered to the professionals for continuous learning, for updating their knowledge and developing their skills to maintain their performance at the current state-of-the-practice and to anticipate on the implementation of new scientific and technological developments. The training schemes allow the individual professional to acquire a profile of skills and expertise, which will be documented in his "Passport of Competences". The purpose and essence of such passport is its recognition within the EU (and possibly abroad) by the whole nuclear sector, thereby providing mobility to the individual looking for employment and providing an EU wide recruitment basis for employers in the nuclear sector. Such EU-wide recognition is subject to qualification and validation of the education and training components

of the EFTS according to a set of commonly agreed criteria, which can be ratified by law or established on a consensus basis within a network.

The assessment of the needs identified a list of generic types of training where specific training schemes have to be developed including courses, training sessions, seminars, workshops, etc. to constitute the portfolio offered to postgraduates and professionals for training and further personal development. Training schemes in the following four generic types will be developed in the project:

- Type A) Basic training in selected nuclear topics for non-nuclear engineers and professionals in the nuclear industry;
- Type B) Basic training in selected nuclear topics for personnel of contractors and subcontractors of nuclear facilities;
- Type C) Technical training for the design and construction challenges of Generation III Nuclear Power Plants;
- Type D) Technical training on the concepts and design of GEN IV nuclear reactors.

3. International Cooperation

European Union

The ENEN Association is intricately involved in several activities on nuclear education and training in the European Union. In addition, the ENEN Association intends to contribute to the European Institute of Technology.

In the framework of the Sustainable Nuclear Energy Technology Platform (SNE-TP) launched in 2007 with the aim of coordinating Research, Development, Demonstration and Deployment (RDD&D) activities in the field of nuclear fission energy, the ENEN co-chairs with the industry the Working Group on Education, Training and Knowledge Management. The objective is to make proposals to the SNE-TP Governing Board on a future framework of nuclear education, training and knowledge management at European level and implement it in a sustainable manner to ensure the availability of knowledge, expertise and skills supporting the development of nuclear energy technology in Europe. Major stakeholders participate to the activities of the three working groups of this Platform: Strategic Research Agenda (SRA), Deployment Strategy (DS) and Education Training and Knowledge Management (ETKM). From this involvement and by its support the ENEN expects closer contacts and interactions with major industrial partners to increase its visibility and enhance their perception of the ENEN's role in professional training and mobility in addition to its reputation as a network of academia.

International Atomic Energy Agency

The ENEN Association continues to be involved in several technical meetings, consultants' meetings, workshops and conferences related to education, training and knowledge management organized by the International Atomic Energy Agency (IAEA).

The ENEN Association exchanges information and participates on a regular basis to meetings of the Asian Network for Education in Nuclear Technology which has been operated by the IAEA. Asian network representatives are invited to the meetings of the ENEN Association.

4. Further Challenges

The ENEN Association has developed a knowledge and human network of European high-level education and training in nuclear-related subjects, in particular within the nuclear disciplines of engineering, radiation protection, radioactive waste management and decommissioning, together with relevant academic and industrial entities and international organizations. In the framework of the ENEN Association major nuclear education, research and some training institutions in Europe are working and acting together through education and training for the renewal of competencies across the nuclear energy life cycle (design, build, operate, decommission and dispose).

The Network contributed to fulfilling the needs of young professionals, academic entities and end-users. Through the ENEN curricula and training packages have been adjusted and the qualifications of young professionals have been enhanced, thereby improving their employment and career opportunities. Its further challenges are:

- Expand into nuclear disciplines outside nuclear engineering such as radiochemistry, nuclear medicine;
- Expand activities from the academic and research environment into the industrial and regulatory organisations and attract their membership;
- Define, harmonise and promote international mutual recognition of professional training for key functions in nuclear industries, regulatory bodies and nuclear technology applications;
- Participate to EC framework projects, in particular in the European Higher Education and European Research Areas; and
- Continue to support and strengthen cooperation with other international and regional networks.

ENEN Association's members include today major universities in the EU27 involved in the education of nuclear disciplines at masters and PhD levels as well as leading research centres. Universities from worldwide, such as Russia, South Africa and Japan decided to join its activities through the establishment of a Memorandum of Understanding and new collaborations will be established in the near future with third countries such as China. Still, the future sustainability of ENEN will rely on a more significant involvement of the "future employers", the nuclear industry and regulatory bodies.

In several FP7 projects, ENEN III, ENETRAP II, PETRUS II, TRASNUSAFE, etc. the ENEN Association will be working with major industry and regulatory bodies. More synergy will be established through the activities of the ETKM working group of SNE-TP, co-chaired by industry and ENEN and its interaction with the two other working groups. For ENEN this will constitute a great opportunity to expand its activities from the academic and research environment to the industrial and regulatory organisations and to attract their membership.

The ENEN Association, its structural bodies and working groups and their members endeavour to implement this challenging programme, which will significantly contribute to the development of higher nuclear education and expertise within the European Union as well as on a global level.

References

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