ENEN Association:
European approaches and initiatives for Nuclear Education & Training and Knowledge Management

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Plan:
1. ENEN presentation
2. Activities and main achievements
3. Perspectives
1. ENEN presentation

STARTING POINT

ECTS (European Credit Transfer and Accumulation System) was introduced in 1989 within the framework of Erasmus.

Bologna Declaration of June 1999
The aim was to create a European Higher Education Area by 2010.

The Lisbon 2000 summit proposed the strategic goal for the European Union to become the most competitive knowledge-based economy with more and better employment and social cohesion by 2010.
HISTORY and DEVELOPMENT - 1

European Commission – EURATOM
5th Framework programme

**ENEN project** in January 2002 – December 2003

Following declarations and policies on phasing out nuclear power plants, nuclear sciences and disciplines are facing
- decreasing interest and a reduced numbers of students
- no successors for retiring professors
- discontinuing nuclear related courses and closing faculties

The “European Nuclear Engineering Network” project:
- established the basis for conserving nuclear knowledge and expertise
- created a European Higher Education Area for nuclear disciplines
- facilitated the implementation of the Bologna declaration in the nuclear disciplines

In order to ensure the continuity of the achievements and results of the ENEN project:

“The European Higher Education Area” in the nuclear field is formalised by creating the European Nuclear Education Network, the “ENEN” Association under the French law of 1901, on 22nd of September 2003
HISTORY and DEVELOPMENT -3

European Commission – EURATOM FP6

35 partners continued and expanded the ENEN activities started in FP 5

ENEN established and implemented the European Master of Science in Nuclear Engineering

ENEN expanded its activities from education to training

ENEN organised and coordinated training sessions and pilot courses

ENEN expanded its activities to Knowledge Management

ENEN - Objectives

The main objective is the preservation and further development of expertise in the nuclear fields by higher education and training

- Promote and further develop the collaboration in nuclear education and training of students, researchers and professionals
- Ensure the quality of nuclear education and training
- Increase the attractiveness for engagement in the nuclear fields for students, researchers and professionals
- Promote life-long learning and career development at post-graduate or equivalent level

It should be achieved by...

- Support to the Universities (exchange of students, lecturers, materials and information etc.)
- Making a bridge between the Universities and the End-users (industries, regulatory bodies, research centres, etc.)
ENEN Members

Effective members
- have a legal status in an EU country or a candidate EU member country
- provide high level scientific education in the nuclear field, as full time teaching or in combination with research work
- “Mutual recognition”
- use selective admission criteria

Associated members
- have a legal status in an EU country or a candidate EU member country
- have a long term tradition of relations with effective members in the field of research, training or education
- commit themselves to support the ENEN Association

Partners through MoU
- Special case in Europe
- Beyond Europe
- International cooperation

ENEN Members in March 2009
- 50 Universities
- 7 Research Centres
- 1 Multinational Company located in 17 European Countries
- MoU concluded with
  - European Nuclear Society
  - North West University, Potchefstroom, South Africa
  - Moscow Engineering Physics Institute, Russian Federation
  - Tokyo Institute of Technology, Japan
  - Japan Atomic Energy Agency, Japan
- Memberships/cooperation under discussion with
  - EC Joint Research Centre, Ispra, Italy
  - IAEA for Asian Network (ANENT) and other items
  - Regulatory bodies etc.

+ Project partners beyond ENEN membership
Overview of ENEN Members

Cooperation beyond EU Framework type-1

- Cooperation between two networks
e.g. MoU with IAEA on the Asian Network (ANENT)
- Possible participation to the EC Framework Programme as a partner
Cooperation beyond EU Framework type-2

- In the absence of the national/regional network, to conclude a memorandum of understanding (MoU) with a leading organisation of each country
- MoU with
  - North West University, Potchefstroom, South Africa
  - Moscow Engineering Physics Institute, Russian Federation
  - Tokyo Institute of Technology, Japan
  - Japan Atomic Energy Agency, Japan etc.

General Assembly
Board of Governors

Day to day work
European and International cooperation

2. Activities in each area and main achievements
ENEN-II project Oct. 2006 – March 2009

- Consolidation of European Nuclear Education, Training and Knowledge Management
  - CENETNOM

- Programme for Education, Training and Research on Underground Storage
  - PETRUS

- Securing European Radiological Protection and Radioecology Competence to meet the Future Needs of Stakeholders
  - EURAC-II

ENEN partners

- 40 PARTNERS
- 27 Contractors
- 15 Members
Master level: European MSc in Nuclear Engineering

- Established under the European Commission – EURATOM 5th FP ENEN project and 6th FP NEPTUNO project
- Common reference curricula and mutual recognition among ENEN members
- Promotes and facilitates mobility of students and teachers
- Definition and assessment of ENEN international exchange courses
- Implemented since 2005
- “ENEN Certificate” recognised among ENEN Members

List of topics
- Reactor engineering
- Reactor physics
- Nuclear thermal hydraulics
- Safety and reliability of nuclear facilities
- Reactor engineering materials
- Radiology and radiation protection
- Nuclear fuel cycle and applied radiochemistry

Requirements
- Full Two Years Program –120 ECTS
- At least 60 ECTS must be “purely nuclear”
- 20 ECTS must be obtained from a “foreign” institution, member of the ENEN Association
- Mandatory and optional courses
- Master thesis
EMSNE Certificates 2007-08

Student receiving the ENEN EMSNE certificate during the FISA conference, Prague June 22nd, 2009

AtomiCareers in Europe – Brussels, Dec 4th, 2009

Revision of the EMSNE is currently under discussion in order to cover other nuclear disciplines

- Radiological Protection, Radiochemistry, Radioecology (under FP6 ENEN II project)
- Radioactive Waste, Geological Disposal (under ENEN II project)
- European Master in Radiation Protection (EMRP, led by CEA/INSTN Grenoble)
- Needs for Safeguards and Nuclear Security (IAEA, EC JRC Ispra, ESARDA) etc.

Master level
Possible expansion of EMSNE in 2009

AtomiCareers in Europe – Brussels, Dec 4th, 2009
**Master level: New Master in Switzerland**

- A new program for a Master of Science degree in Nuclear Engineering
  
  Started in September 2008

- Offered jointly by the Swiss Federal Institutes of Technology, EPF Lausanne and ETH Zurich.

- One semester course at each of the two university (Lausanne, Zurich),

- Master’s research project will generally be carried out at the Paul Scherrer Institute (PSI)

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**FRANCE: A new 2 years’ Master degree in NUCLEAR ENERGY**

![Diagram of the Master's program structure](image)
International Exchange course

„Eugene Wigner” Training Course for Reactor Physics Experiments 2008
with special emphasis to enhance Research Reactor Safety

Organising institutions

Budapest University of Technology and Economics (BME) Hungary
Slovak University of Technology in Bratislava (STUB) Slovak Republic
Vienna University of Technology, Atominstitut (AI) Austria
Czech Technical University in Prague (CTU) Czech Republic

http://www.reak.bme.hu/Wigner_Course/

Editions
2003
2004
2005
2006
2008

21 days’ course
Starting in September,
Equivalent to:
6 ECTS

Content of the course

Lectures (Slovak University of Technology, Bratislava)
The theoretical lectures will be held in the lecture halls of Slovak University of Technology, Bratislava (STUB), Slovak Republic.
The course program and timetable will be published later on the webpage of the Wigner Course (see on the bottom of this booklet). The programme of the previous years can be consulted to have a feel what kind of lectures are to be expected.

Experiments (Czech Technical University in Prague)
- Measurement of decay constant for various radionuclides
- Study of reactor monitor dynamics
- Digital control and safety systems of the research reactors and reactor operation

Experiments (Vienna University of Technology, Austria)
- Fission chambers (FC), compensated ionization chambers (CIC), self-powered (SP) detectors
- Reactor power calibration and temperature coefficient of reactivity
- Critical experiment
- Determination of prompt critical power expansion

http://www.reak.bme.hu/Wigner_Course
PhD level – Advanced courses

- 17 Universities participates to IP EUROTRANS under the ENEN umbrella
- ENEN
  - Represents them at the EUROTRANS Coordination Committee
  - Provides links between research scientists and doctoral students
  - Organises / Facilitates lectures, specialise internal training courses (10)

EUROTRANS Internal Training Courses

- ITC8 "Impact of new results on the design of the spallation target and the subcritical blanket" Italy 3 – 6th, February 2009
- ITC7 "Impact of new nuclear data on the design of transmutation experiments" France 15 – 18th, December 2008
- ITC6 “Core design and reactor safety analysis” in Madrid, Spain, 2-5 April 2008
- ITC5 "Fuel and Structural Reactor Materials" in Pisa, Italy, 26-29 November 2007
- ITC4 "Particle Accelerator Technology" in Mol, Belgium, 10-11 May 2007
- ITC3 "ADS thermal-hydraulics: system codes and CFD codes, models and experimental validation” in Louvain-la-Neuve, Belgium, 21-23 March 2007
- ITC2 "Nuclear data for transmutation: status, needs and methods” in Santiago de Compostela, Spain, 7-10 June 2006
- ITC1 "ADS: objectives, context, concepts, challenges” in Stockholm, Sweden, 5-9 October 2005
PhD level – Advanced courses

International Training Course (ITC-9):
- Accelerator-driven Transmutation System for European and Asian Young Scientists and Engineers
- Date: December 1-4, 2009
- Place: Nuclear Technology and Education Center / JAEA, Tokai, Ibaraki, Japan
PhD level: Annual ENEN PhD Event

- One-day event during an international conference
- 12-14 PhD students
- ENEN Prize
- ENEN Alumni
  - 1st at International Youth Conference on Energetics 2007 in Budapest, Hungary, 1 June 2007
  - 2nd at International Youth Nuclear Congress (IYNC) in Interlaken, Switzerland, 23 September 2008 in collaboration with the EC JRC
  - 3rd at International Youth Conference on Energetics 2009 in Budapest, Hungary, 4-7 June 2009
Professional Training Programmes

Professional Training Programmes
Knowledge Management

ENEN Website and Database

- ENEN Website
  http://www.enen-assoc.org
- NEPTUNO Database (Aug 2004–)
  http://www.neptuno-cs.de/
- E&T courses by ENEN Members
- A new ENEN Database (to be opened soon)
  - E&T courses
  - Master program
  - PhD topics
  - Opportunities (scholarship, fellowship, internship, job opportunities)

provided by ENEN Members and Partners

Knowledge Management

ENEN publications

- First text book
  published under ENEN as a deliverable of ENEN II project
  - 18 chapters, 670 pages including exercises and solutions
  - mainly for students, young professionals and researchers
- CD-ROM including multimedia presentations for the general public
3. PERSPECTIVES

For young professionals:
Three EFTS projects starting in 2009

- Three projects on Euratom Fission Training Schemes will start in 2009
- The objective is to establish a Training Scheme which covers the structuring, organisation, coordination and implementation of training in cooperation with local, national and international training organisations, to provide training courses and sessions at the required level to professionals in nuclear organisations or their contractors and subcontractors.

   To establish a common certificate for professionals at European level
For young professionals
Three EFTS projects starting in 2009

**ENETRAP II project**
on radiation protection
(12 partners from 12 countries)

**ENEN III project** on
nuclear engineering
(19 from 12 countries)
on radioactive

**PETRUS II project**
waste disposal
(14 from 10 countries)

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For professionals: ENEN-III Project

ENEN-III project on Nuclear Engineering
- Three-year project: 2009 - 2011
- Four training schemes
  - Basic Nuclear Topics for Non-Nuclear Engineers
  - Design Challenges for Generation III NPP
  - Construction Challenges for Generation III NPP
  - Design Challenges for Generation IV Reactors
- Coordinated by the ENEN Association
- 19 Partners in 12 countries
  - ENEN, SCKCEN, UCL, TKK, LUT, INSTN, AREVA, ISaR, BME, CIRTEM, DUT, UPB, UL, JSI, TECNATOM, UPM, UPC, HMS SULTAN
FP7 TRANSNUSAFE project

- Another Euratom Fission Training Scheme (EFTS) project on Nuclear Safety Culture
- 19 partners from 9 countries
- Coordinated by UCL, Belgium
- For 4-years
- The objective is to design, develop and test two relevant training schemes on Nuclear Safety Culture within a European environment, based on a specific evaluation of the training needs.

Proposed FP7 : Cooperation with Russia - 1

- Title “Development of common ground for cooperation in nuclear education, training and knowledge management”
- Meetings and discussions since June 2008
- Submitted in April 2009
- For the period of two years
- Objective: to define a common basis to allow effective cooperation between the European and Russian networks for nuclear education and training
- The work should start by analysis of the present situation on both sides, define opportunities and barriers for cooperation, test solutions through pilot exercises and define a road map for the expansion of the cooperation
Proposed FP7: Cooperation with Russia - 2

Project partners

- ENEN
- SCKCEN, Belgium
- Czech Technical University in Prague, Czech
- Nuclear Research Institute Rez plc., Czech
- Stuttgart University, Germany
- University Politehnica Bucharest, Romania
- Slovak University of Technology in Bratislava, Slovakia
- TECNATOM, Spain

All ENEN Members will have an opportunity to contribute under the ENEN umbrella

Proposed FP7 projects: Cooperation with Russia and CHINA

As of 1 December 2009,

- The proposal was accepted by the European Commission in summer 2009. Upon receipt of the official go-sign from the Russian side, the project will start.

- A similar project for corporation with CHINA is currently under preparation. It is to be submitted next spring.

PARTICIPATION FROM THE INDUSTRY IS WELCOMED!
European Japanese Exchange Project in Nuclear Disciplines

- EU-ICI-ECP Programme for Cooperation in Higher Education and Training
- Mobility programme for students at the Master level of Nuclear Engineering and other Nuclear Disciplines related to the application of nuclear technologies and radiation sciences
- Japanese partners
  - Tokyo Institute of Technology
  - Kyoto University
  - Japan Atomic Energy Agency
- For 3-years from the beginning of 2010
- Expect to have similar type of projects with other non-EU countries
The Sustainable Nuclear Energy Technology Platform

The Council welcomes the existence within the European Union of coordinated teaching and training leading to qualifications in the nuclear field, provided notably by the ENEN.

The Council hopes that, with the help of the EU, ENEN and its members will continue to develop the coordination of nuclear education and training in Europe.

The Council insists that the appropriate conditions must be created for mutual recognition of nuclear professional qualifications throughout the European Union.

The Council encourages the Member States and the Commission to establish a "review of professional qualifications and skills" in the nuclear field for the European Union, which would give an overall picture of the current situation and enable appropriate solutions to be identified and implemented.

EU Council, 1-2 December 2008
THANK YOU FOR YOUR ATTENTION

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