The European Nuclear Education Network: working areas and experience of cooperation

Walter Ambrosini
President of the European Nuclear Education Network
ATOMEXPO 2015
Round Table «Methods and mechanisms of international cooperation to support E&T for sustainable nuclear power development»
Moscow, Russian Federation, June 1st, 2015
General information on ENEN
HISTORY and DEVELOPMENT

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
The European Nuclear Education Network is a non-profit international organization established on 22 September 2003 under the French Law of 1901.

Its mission is the preservation and further development of expertise in the nuclear fields by higher education and training through:

• promotion of networking for education and training in Europe
• favouring borderless mobility of students and teachers
• providing attractiveness for young and motivated students
• leading relevant EU Projects for E&T and R&D among which EFTS
• qualifying itself as a reference institution for the cross-cutting issue of E&T in the nuclear fields: a “bridge” academia ↔ stakeholders

ENEN presently involves Universities or University clusters, Research Institutions, Industrial Bodies and International Agencies or Societies.
# ENEN Members

## List of Members of ENEN

The following European institutions are members of ENEN with voting rights at the General Assembly:

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<tr>
<th>No.</th>
<th>Member Institution</th>
<th>City</th>
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<td>1</td>
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ENEN Members

The following institutions from outside Europe are considered ENEN Member, without voting rights at the General Assembly, by concluding a Memorandum of Understanding:

54. Japan Atomic Energy Agency (JAEA) in Tokai, Japan
55. Tokyo Institute of Technology (TokyoTech) in Tokyo, Japan
56. University of Fukui (FUKUI) in Fukui, Japan
57. Central Institute for Continuing Education and Training (CICET) in Obninsk, Russia
58. Moscow Engineering Physics Institute (State University) (MEPhI) in Moscow, Russia
59. North West University (NWU) in Potchefstroom, South Africa
60. Odessa National Polytechnic University (ONPU) in Odessa, Ukraine
61. V. N. Karazin Kharkiv National University (KKNU) in Kharkiv, Ukraine

The following international institutions are considered ENEN Member, without voting rights at the General Assembly, by concluding a Memorandum of Understanding:

62. International Atomic Energy Agency (IAEA) in Vienna, Austria
63. European Nuclear Society (ENS) in Brussels, Belgium
64. University Network of Excellence in Nuclear Engineering (UNENE) in Ontario, Canada
65. Joint Research Centre of the European Commission (JRC) in Europe
66. World Nuclear University (WNU) in London, United Kingdom

All these 66 institutions from 18 EU Countries + World benefit at different extents of the existence of ENEN and of its actions.
ENEN Structure

General Assembly
Board of Governors

Secretary General
WG1  WG2  WG3  WG4  

Action 1
Action 2
Action 3
Action 4

Quality Assurance

Teaching and Academic Affairs Area

Advanced Courses and Research Area

Training and Industrial Projects Area

Knowledge Management

Day to day work

- 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-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

Consolidation of European Nuclear Education, Training and Knowledge Management
ENEN-II
MAIN ACHIEVEMENTS
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
Master level: European MSc in Nuclear Engineering

- 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
  - At least 300 ECTS at university level
  - At least 60 ECTS must be “purely nuclear”
  - 20 ECTS must be obtained from a “foreign” institution, member of the ENEN Association
  - Master thesis
Latest EMSNE Award Ceremony

Students receiving the ENEN EMSNE certificate during the 58th General Conference of IAEA in Vienna, September 25th, 2014
Promotion of Activities at ENEN Members

- **Master in Switzerland**
- **Master of Sciences Nuclear Energy in France**
- **Master in Nuclear Engineering at UPC Barcelona (EMINE)**
- **EMINE Master under KIC InnoEnergy (UPC, KTH, Grenoble, Paris)**
- **PhD Level Courses**
- **Training Courses**
PhD level: Annual ENEN PhD Event

- One-day event during an international conference
- 12-14 PhD students
- ENEN Prize and 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
  - 4th PhD event, ENC 2010, Barcelona June 2nd, 2010
  - 5th PhD event, ICAPP 2011, Nice May 4th, 2011
  - 6th PhD event, Inter. Conf. Nuclear Energy for New Europe in Ljubljana, September 6th, 2012
  - 7th PhD event, 16th Inter. Conf. on Emerging Nuclear Energy Systems (ICENES), in Madrid, Spain, 28-29 May 2013
  - 8th PhD event, 8th International Youth Congress, IYNC2014, Burgos, Spain from 9 – 10 July 2014
  - 9th ENEN PhD Prize & Event in the framework of the International Congress on Advances in Nuclear Power Plants (ICAPP) 2015 in Nice, France, 5-6 May 2015.
Knowledge Management
ENEN publications
and Database

Neutron physics
• 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.

Multimedia on Nuclear Reactor Physics
• Promoted and distributed by IAEA to 53 countries.
• About 800 slides.
• 4 languages.
• For education and training.
Further European Projects
FP7 European Fission Training Schemes

Common certificate for professionals at European level

**Participation in TRASNUSAFE** - Nuclear Safety Culture: addressing mainly the health physics sector (November 2010 - October 2014)

**Coordination of ENEN III** - Training schemes for Generation III and IV engineers: addressing mainly the nuclear systems suppliers (May 2009 – April 2013) – *Use of ECVET system*

**Participation in ENETRAP II** - European Network on E&T in Radiological Protection: addressing mainly the nuclear safety authorities (March 2009 - December 2012)

Single Beneficiary of NUSHARE – Project for sharing and growing nuclear safety competence: focus on 3 target groups (policy makers, nuclear regulatory authorities, industry) (January 2013 – December 2016) – TO BE DISCUSSED in the POST-FISA WORKSHOP #2
Cooperation beyond EU (FP7)

Coordination of ENEN-RU and ENEN RU II - Cooperation with Russia in Nuclear Education, Training and Knowledge Management: focus on the mobility of teachers and students (November 2010 – October 2012) and (2014 – 2016)

Coordination of ECNET - Cooperation with China in Nuclear Education, Training and Knowledge Management: focus on the mobility of teachers and students (November 2010 – October 2012)

Bilateral Cooperation between Industrialised Countries (EACEA)

EUJEP - Project (Japan), now renewed as EUJEP 2
Foster, organize and implement exchanges of European and Japanese Master level students with mutual recognition of credits
OTHER PROJECTS INVOLVING ENEN

- **FP7 CORONA and H2020 CORONA II** Establishment of Regional Center of Competence for VVER Technology and Nuclear Applications (2011 – 2014)
- **FP7 CINCH-II** - Cooperation in education and training In Nuclear Chemistry: focus on the European master's degree in nuclear and radiochemistry (June 2013 – May 2016)
- **FP7 EUTEMPE-RX** - EUropean Training and Education for Medical Physics Experts in Radiology: (September 2013 – August 2016)
- **FP7 GENTLE** - Graduate and Executive Nuclear Training and Lifelong Education (January 2013 – December 2017)
- **FP7 PELGRIMM**: PELlets versus GRanulates: Irradiation, Manufacturing & Modelling (2012 – 2015)
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.
HEARING AT THE EU PARLIAMENT

On February 12, 2014, ENEN was invited to participate in the hearing on the new nuclear safety directive, at the committee on industry, research and energy (ITRE), in the EU parliament.

ENEN defended the support to the Education and Training in the nuclear field as a necessary contribution to assure the Nuclear Safety throughout Europe and beyond, together with the promotion of a healthy Nuclear Safety Culture.

ENEN described the NUSHARE Project, as a service to the European citizens, aiming at enhancing and better spreading nuclear safety culture principles, in line with the emphasis on this aspect in the proposed amendments to the new “nuclear safety directive”.

http://www.enen-assoc.org/en/about/the-10th-birthday-enen1.html
A HORIZON 2020 PROPOSED PROJECT IN THE WAITING LIST

ANNETTE
Advanced Networking for Nuclear Education and Training and Transfer of Expertise

Proposed logo:
Master and Summer School for CPD

Production of teaching material

ECVET application in industry

Initiatives for NSC enhancement

FUNCTIONAL SKETCH OF THE PROJECT

WP1
SURVEY AND COORDINATION OF NETWORKING IN NUCLEAR E&T AND VET IN THE NUCLEAR AREAS

WP2
DESIGN AND IMPLEMENTATION OF COORDINATED E&T AND VET EFFORTS

WP3
GENERATIONAL TRANSFER OF EXPERTISE

WP4
CROSS BORDER TRANSFER OF EXPERTISE

WP5
ETI ACTIONS RELATED TO NUCLEAR SAFETY CULTURE

WP6
Coordinating the nuclearization of FUSION

WP7
INTERACTION WITH PLATFORMS and other BODIES

WP8
PROJECT MANAGEMENT

Contacts with Platforms, etc.

FuseNet asked to join to coordinate «nuclearization»
A POSITIVE DYNAMICS ALREADY STARTED

- Joint E&T actions in NS&E, RP, WM and GD are envisaged

- The idea was proposed to MELODI and IGD-TP, receiving an early endorsement; EHRO-N also supported it and recently we received endorsements from SNE-TP, FORATOM and ENS, the GENTLE project, ESARDA, together with the NUGENIA label

- Colloquia with IAEA revealed the large potential for extending this action beyond European borders in due time

- The joining of FuseNet testifies for a further need of jointness in managing existing interfaces FUS-FISS
IMMEDIATE FRUITS OF THE POSITIVE DYNAMICS

• On February 12, 2015 in Culham, UK, signature of a MoU with FuseNet
IMMEDIATE FRUITS OF THE POSITIVE DYNAMICS

• The ENEN Honorary Membership in NUGENIA

• Just in these days we are filling this promising slot of activities with sound common actions
Why we are here ...
WITHIN ALL THIS COORDINATING EFFORT RUSSIA AND EU NOW LOOK AT EACH OTHER

ENEN-RU II PROJECT

“Strengthening of Cooperation and Exchange for Nuclear Education and Training between the European Union and the Russian Federation”

The entire project consist of two parallel projects on the EU side and the Russian side
Why such a project?

- Nuclear energy encourages mankind to develop unity of intents and cooperation: it is by nature “unifying” because it is so powerful.

- As such, it stimulates to join into “win-win” actions.

- Enhancing SAFETY and assuring the future nuclear workforce requires sharing resources in E&T and harmonising our views by learning from each other.
ENEN-RU II
Selected objectives

• To establish the criteria for mutual recognition at BSc, MSc and training levels (WP1)

• To establish the ENEN-RU E&T Forum to discuss short and long term common strategies (WP2)

• To exchange students and teachers at MSc and PhD level, making use also of distant learning tools (WP3)

• To enable joint training activities (WP4)

• Further develop a database for E&T Facilities, Laboratories and Equipment (WP5)
ENEN-RU II
A project to be made real…

• Joining our efforts in mutual benefit is now possible
  ✓ we have a sound bilateral frame of cooperation
  ✓ distances are nowadays becoming immaterial for students and teachers
  ✓ web-based means favour knowledge transfer
  ✓ openness is a mutual benefit: we teach and learn at the same time
  ✓ students and trainees will be eager to mix and share expertise

WE ARE BUILDING SOMETHING VALUABLE AND DURABLE. LET’S CATCH THIS GREAT OPPORTUNITY !!!
Спасибо за внимание!

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