



## **Project summary**

### **Introduction**

Radiation protection is a major challenge in the industrial applications of ionising radiation, both nuclear and non-nuclear, as well as in other areas such as the medical and research area. As is the case with all nuclear expertise, there is a trend of a decreasing number of experts in radiation protection due to various reasons. On the other hand, current activities in the nuclear domain are expanding: the nuclear industry faces a so-called "renaissance", high-tech medical examinations based on ionising radiation are increasingly used, and research and non-nuclear industry also make use of a vast number of applications of radioactivity.

Within this perspective, maintaining a high level of competency in radiation protection is crucial to ensure future safe use of ionising radiation and the development of new technologies in a safe way. Moreover, the perceived growth in the different application fields requires a high-level of understanding of radiation protection in order to protect workers, the public and the environment of the potential risks. A sustainable Education and Training (E&T) infrastructure for radiation protection is an essential component to combat the decline in expertise and to ensure the availability of a high level of radiation protection knowledge which can meet the demands in the future.

Although radiation protection professionals have a variety of responsibilities and specific professional aims, there is a common need for:

- basic education and training providing the required level of understanding of artificial and natural radiation;
- the opportunity to update and test acquired knowledge on a regular basis (Continuous Professional Development); and
- a standard for the recognition of skills and experience,

In addition, complying with specific European directives concerning the implementation of a coherent approach to education and training becomes crucial in a world of dynamic markets and increasing workers' mobility.

Today's challenge involves measures to make the work in radiation protection more attractive for young people and to provide attractive career opportunities, and the support of young students and professionals in their need to gain and maintain high level radiation protection knowledge. This can be reached by the development and implementation of a high-quality European standard for initial education and continuous professional development for Radiation Protection Experts (RPEs) and Radiation Protection Officers (RPOs).

For the purposes of this project , the Radiation Protection Expert, can be defined as :

*“a person having the knowledge, training and experience needed to give radiation protection advice in order to ensure effective protection of individuals”*

and the Radiation Protection Officer as:

*“An individual technically competent in radiation protection matters relevant for a given type of practice who is given the role of overseeing the application of relevant radiation protection standards in the workplace”.*

## **Objectives**

The overall objective of this project is to develop European high-quality "reference standards" and good practices for education and training (E&T) in radiation protection (RP), specifically with respect to the RPE and the RPO. These "standards" will reflect the needs of the RPE and the RPO in all sectors where ionising radiation is applied (nuclear industry, medical sector, research, non-nuclear industry). The introduction of a radiation protection training passport as a mean to facilitate efficient and transparent European mutual recognition is another ultimate deliverable of this project.

With respect to the RPE the overall objective is to be achieved by addressing both education and training requirements. In the field of education this project deals with high-level initial programmes, mainly followed by students and/or young professionals. It is foreseen to analyse the European Master in Radiation Protection course, which started in September 2008. This Master is organised by the consortium of universities as established in the ENETRAP 6FP. Broadening of the consortium and quality analysis of the providers and the content of the modules can be performed according to, primarily, the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ENQA) and, secondly, to the ENEN standards.

In the field of RPE training the ultimate goal is the development of a European mutual recognition system for RPEs. Hereto, the ENETRAP Training Scheme initiated as part of the ENETRAP 6FP will be used as a basis for the development of a European Radiation Protection Training Scheme (ERPTS), which includes all the necessary requirements for a competent RPE. In addition, mechanisms will be established for the evaluation of training courses and training providers. These actions will contribute to facilitate mutual recognition and enhanced mobility of these professionals across the European Union.

With respect to the RPO role the desired end-point is an agreed standard for radiation protection training that is recognised across Europe. Data and information obtained from the ENETRAP 6FP will be used to develop the reference standard for radiation protection training necessary to support the effective and competent undertaking of the role.

Furthermore, attention is given to encouragement of young, early-stage researchers. In order to meet future needs, it is necessary to attract more young people by awaking their interest in radiation applications and radiation protection already during their schooldays and later on during their out-of-school education (university or vocational education and training). Radiation protection experts and officers work more and more on a European level. It is therefore important bringing together all the national initiatives at a European level: tomorrow's leaders must have an international perspective and must know their colleagues in other countries.

It is envisaged that the outcome of this project will be instrumental for the cooperation between regulators, training providers and customers (nuclear industry, medical sector,

research and non-nuclear industry) in reaching harmonization of the requirements for, and the education and training of RPEs and RPOs within Europe, and will stimulate building competence and career development in radiation protection to meet the demands of the future.

Specific objectives of the project are:

- i) Develop the European radiation protection training scheme (ERPTS) for RPE training;
- ii) Develop a European reference standard for RPO training;
- iii) Develop and apply a mechanism for the evaluation of training material, courses and providers;
- iv) Establish a recognised and sustainable ERPTS "quality label" for training events;
- v) Create a database of training events and training providers (including On-the-Job-Training) conforming to the agreed ERPTS;
- vi) Bring together national initiatives to attract early-stage radiation protection researchers on a European level;
- vii) Develop some course material examples, including modern tools such as e-learning;
- viii) Develop a system for monitoring the effectiveness of the ERPTS;
- ix) Organise pilot sessions of specific modules of the ERPTS and monitor the effectiveness according to the developed system;
- x) Development of a European passport for Continuous Professional Development in Radiation Protection.

## **State of the art**

### *European Directive and first answers to training needs*

For European Union Member States, requirements related to radiation protection training are laid down in Council Directive "96/29/EURATOM" of 13 May 1996. It lays down basic safety standards for the health protection of the general public and workers against the dangers of ionizing radiation (OJ L-159 of 29/06/96). Communication 98/C 133/03 (OJ L-133 of 30/04/98) from the Commission concerning the implementation of the above Council Directive 96/29/Euratom describes a European syllabus for the training requirements for the recognition of "qualified experts" in radiation protection.

A revision of Council Directive 96/29/Euratom is currently being prepared. The results of this project can contribute to the advice submitted to the European Commission and the Group of Experts according to art 31 of the Euratom Treaty, who are preparing the revision of this Directive. The outcome of the project may also lead to a new guidance document to replace Communication 98/C 133/03.

In 2000 the European Radiation Protection Course (ERPC) was launched to deliver the theoretical knowledge needed to be recognised as a qualified expert on the basis of the above-mentioned Council Directive and of the related IAEA Post Graduate Education Course Syllabus. There were, however, strong barriers for the attendance of this ERPC course, e.g. the lack of recognition by the national competent authorities across the Member States.

### *ENETRAP 6FP*

A revision of the ERPC was one of the challenges dealt with by ENETRAP 6FP. By means of a questionnaire sent out to all Member States, Associated States, Norway and Switzerland, ENETRAP 6FP gathered information on training capabilities and needs, and on the criteria for recognition of qualified experts in different EU countries. Based on that, and taking into account results of an implementation study concerning On-the-Job-Training, Work

Experience, and modern training tools such as e-learning, the ENETRAP Training Scheme was developed, which can be regarded as a basis for further development into the ERPTS for RPEs.

### EUTERP

The results of ENETRAP 6FP was submitted to the EUTERP Platform. This Platform addresses all stakeholders of RP training and has amongst its members representatives from regulatory bodies, training providers, research centres, medical physicists, professional societies, international organisations and international projects. One of the tasks of this Platform is to advise on a revision of the definition of the qualified expert. Another task is to seek international agreement on the requirements and qualifications for the RPE and RPO, in order to remove barriers for mobility of these professionals within the European Union. The results of this project will be brought under the attention of the EUTERP Platform as a means to establish such an agreement.

### Beyond state of the art: contribution to high-quality research

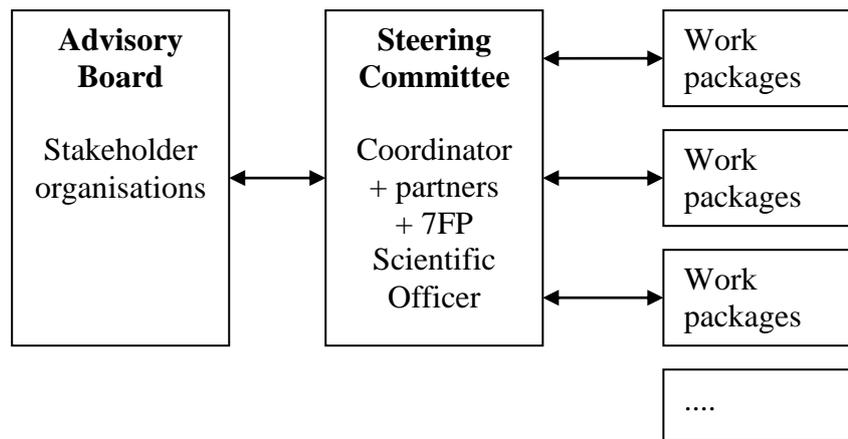
Today's challenge involves the support of young students and professionals in gaining and maintaining radiation protection knowledge. This can be reached by the development and implementation of a high-quality European standard for initial education and continuous professional development for Radiation Protection Experts (RPEs) and Radiation Protection Officers (RPOs).

This project will deal with the fundamental questions concerning the required RPO competencies and the requirements and methodology for recognition of RPEs. Based on this, European "reference" training standards will be developed meeting these requirements. Furthermore the introduction of a European radiation protection training passport will be studied, facilitating an efficient and transparent comparison to these "reference" training standards, thus assisting mutual recognition on a European basis.

### **Overall strategy and general description**

A Steering Committee is established to oversee and co-ordinate the progress of the project. The Steering Committee will set up and report to an Advisory Board, which at its turn will also give feed back and guidance to the Steering Committee.

The Advisory Board will be composed in such a way that all relevant stakeholders, with respect to the stated aim of the project, are represented (e.g. regulatory bodies, E&T providers, research institutes, end-users from nuclear industry, medicine and non-nuclear industry, etc.).



The objectives of ENETRAP II will be reached by several activities dealing with

- the analysis of job requirements (RPE and RPO),
- the design and implementation of appropriate training standards and schemes to support these requirements,
- development and application of a quality assurance mechanism for the evaluation of the training events, used material and training providers,
- setting up a database of training events and providers conforming to the agreed standards,
- the development of training material (traditional texts, as well as the introduction of more modern tools such as e-learning modules) that can be used as example training material,
- monitoring the effectiveness of the proposed training schemes

The final goal is the development of a European mutual recognition system for RPEs and the introduction of a training passport.

In addition to these primary activities, consideration will be given as to the best means of attracting young people to the field of radiation protection.

All these activities are carried out in the work packages defined here under.

WP1	Co-ordination of the project
WP2	Define requirements and methodology for recognition of RPEs
WP3	Define requirements for RPO competencies and establish guidance for appropriate RPO training
WP4	Establish the reference standard for RPE training
WP5	Development and apply mechanisms for the evaluation of training material, events and providers
WP6	Create a database of training events and training providers (including OJT) conforming to the agreed standard
WP7	Develop of some course material examples (text book, e-learning modules, ...)
WP8	Organise pilot sessions, test proposed methodologies and monitor the training scheme effectiveness
WP9	Introduction of the training passport and mutual recognition system of RPEs

## WP10 Collaboration for building new innovative generations of specialists in radiation protection

WP1 in the first stage deals with running the Network and its work programme. This will require the implementation of the Steering Committee to take the decisions, to deal with the follow-up, to propose improvements and to organise the exchange of information. During the initiating period, meetings will be held in order to constitute the network and to define its working methodology in detail. In addition, an Advisory Board will be set up, giving feedback and indicating directions to the Steering Committee. This Advisory Board will be composed in such a way that all relevant stakeholders, with respect to the stated aim of the project, are represented. In addition, within WP1 also a project website will be developed. Special attention will be given to a visible place on the website where future employers can post opportunities for master theses or internships, thereby opening the doors of their laboratories or hospitals (or associated services) to foreign trainees. Also participation in some specific activities of research projects (e.g. FP7) can be encouraged through this web space.

WP2 deals with the requirements for recognition of RPEs and the development of a methodology for the recognition of RPEs. Although the execution of any recognition process is the responsibility of the national Regulatory Authority, ENETRAP II will put forward a harmonised methodology, into line with the national approaches. The existence of this European methodology will facilitate the ultimate goal: a European mutual recognition process for RPEs. Qualification, competence, and continuous professional development will be discussed and elements for these three requirements will be defined.

Employees, appointed to act as RPOs in hospitals, industrial companies or teaching and research institutions should have an adequate level of understanding of concepts related to radiation protection and understand the radiation protection issues pertinent to their radiation application. Therefore the level and format of training required by an RPO is dependant on the complexity of that application. It is therefore essential, on the European level, (i) to define requirements for the competencies of RPOs according to their area of work and specific radiation protection tasks, and (ii) to establish European reference standards for RPO training. This is the objective of WP3. It is worth noting that while, in many cases the need for mobility in RPOs is not essential, there are a number of areas, for example, in industrial radiography, where radiation protection is an inherent aspect of the work and where there is a significant degree of movement of personnel between countries. In such cases mutual recognition of education and training undertaken would be beneficial and, consequently, some form of training “passport” advantageous.

WP4 continues on the achievements of WP2. Here, it is the aim to develop appropriate European radiation protection training schemes (ERPTS), with objectives, target audience(s), audience prerequisites, required topics, suggested durations and evaluation methods for both initial and refresher training of RPEs, taking into account the nature and requirements of the RPE role. The starting point is the ENETRAP 6FP Training Scheme. Furthermore internationally recognised training material such as the material developed by the IAEA will be incorporated. The ERPTS should meet the requirements of the revised definitions of the RPE and should eventually replace Communication 98/C133/03, as a guide for the Member States to develop, or evaluate, their national strategies for RPE qualification and recognition. The ERPTS should cover a broad knowledge of radiation protection fundamentals, as well as application-specific issues. The ERPTS would facilitate in an objective way individual

national authorities in assessing the adequacy and completeness of their own training programmes and compare it with the training programme of other countries. EU wide agreement on the ERPTS would harmonize the qualification of RPEs, while keeping flexibility on a national scale on how to organize their training programme.

Advantage will be taken of existing training schemes that have proven to be efficient. It will be investigated whether they could be "Europeanised", bearing in mind the different scientific cultures and regulatory environments amongst the EU Member States. The experience ("lessons learnt") from some non-nuclear high-tech sectors could also be of interest, e.g. training schemes in the public health sector, in nanotechnologies, etc.

WP5 deals with the development and application of mechanisms for the evaluation of training material, events and providers. In Europe, a vast number of training events, material and providers exist. Given that formal recognition is required for RPEs, it would be prudent for training providers involved in the RPE training process to also be formally recognised. The aim of this WP5 is develop a mechanism for the comparison, through a transparent and objective methodology, of training materials, courses and training providers, which can be used by regulatory authorities to evaluate their national radiation protection training programme for compliance with the ERPTS. It is obvious that close collaboration with the national regulatory authorities will be established in order to maximise acceptance of the stakeholders. A survey of applied quality protocols for training material, training event, and training providers in the member states will be carried out. The proposed quality procedures will be in line with world-wide standards like ISO taking into account the protocols currently in use in Europe.

WP6 creates a database of training event and providers conform to the agreed standards. The database will be made public through the ENETRAP II website and is thus available for all interested parties. Such a move would add credibility to the recognition process and would help to provide reassurance to RPE candidates and to employers that the training obtained satisfies an agreed European standard. This database will also incorporate an overview of institutes hosting on-the-job-training possibilities. Special attention will also be given to internships in the stakeholders' organisations, with emphasis on coaching and/or mentoring schemes, whenever appropriate. A link can be made with the existing ENEN database.

It is obvious that the courses organised by or at the premises of the partners can be taken as first examples. Examples of training courses that will be introduced are:

(for Belgium) course for radiation protection expert (in Dutch and French)

(for UK) modular Radiation Protection Training Scheme (RPTS) specifically targeted at new and developing RPEs

(for Germany) Occupational Radiation Protection: Specificities of Waste Management and Decommissioning

In order to provide examples of standardised training material, meeting the requirements of the ERPTS, WP7 will foresee in European text books for several modules of the ERPTS. This textbook is foreseen to be written in English. Since a lot of texts already exist in different countries (and thus different languages), the main work will involve the structuring of this material according to the developments of WP2, 3 and 4, and the translation to English. WP7 will not limit its activities to traditional learning methods, but will also develop ERPTS modules through e-learning platforms. For this last point, ENETRAP II will build further on the work done within the ENETRAP 6FP. The achievements are reported in "WD.08 report on available tools and new concepts for RP training".

As tentative title for the textbook, “Course manual for the European training scheme in radiation protection”, is put forward.

In order to monitor the effectiveness of the proposed methodologies, pilot sessions will be organised. WP8 concentrates on the organisation and supervision of at least three different modules of the ERPTS. From the evaluation and experience of such pilot events recommendations and in case improvements will be expected thus ensuring mutual feedback with the previous WPs.

The courses can be organised traditionally and/or electronically (e.g. using e-learning or distance learning). The EFTS could consist of a mix of internships and collective or individual courses, addressing a variety of profiles. Within the past ENETRAP 6FP, preliminary steps were taken with regard to the organisation and evaluation of pilot courses, using the developed e-learning platform. This experience will be used in ENETRAP II in order to further develop and test several (pilot) courses. Non-EU organisations are welcome to participate, if added value is demonstrated. In addition to the EFTS driven activities, the trainees may naturally participate in existing courses in the EU or abroad, as part of their European Passport.

Pilot courses will be organised in the domain of RP in Waste Management and Decommissioning, RP in Non Nuclear and Research, and other relevant application fields (to be defined in the first phase of the project).

Monitoring of the effectiveness will also be performed using existing courses, organized outside the ENETRAP II project. Examples are:

Radioisotope Training Course, Karlsruhe,

Courses for RPOs in various fields, Karlsruhe

course for radiation protection expert (in Dutch and French), Belgium

modular Radiation Protection Training Scheme (RPTS) specifically targeted at new and developing RPEs, UK

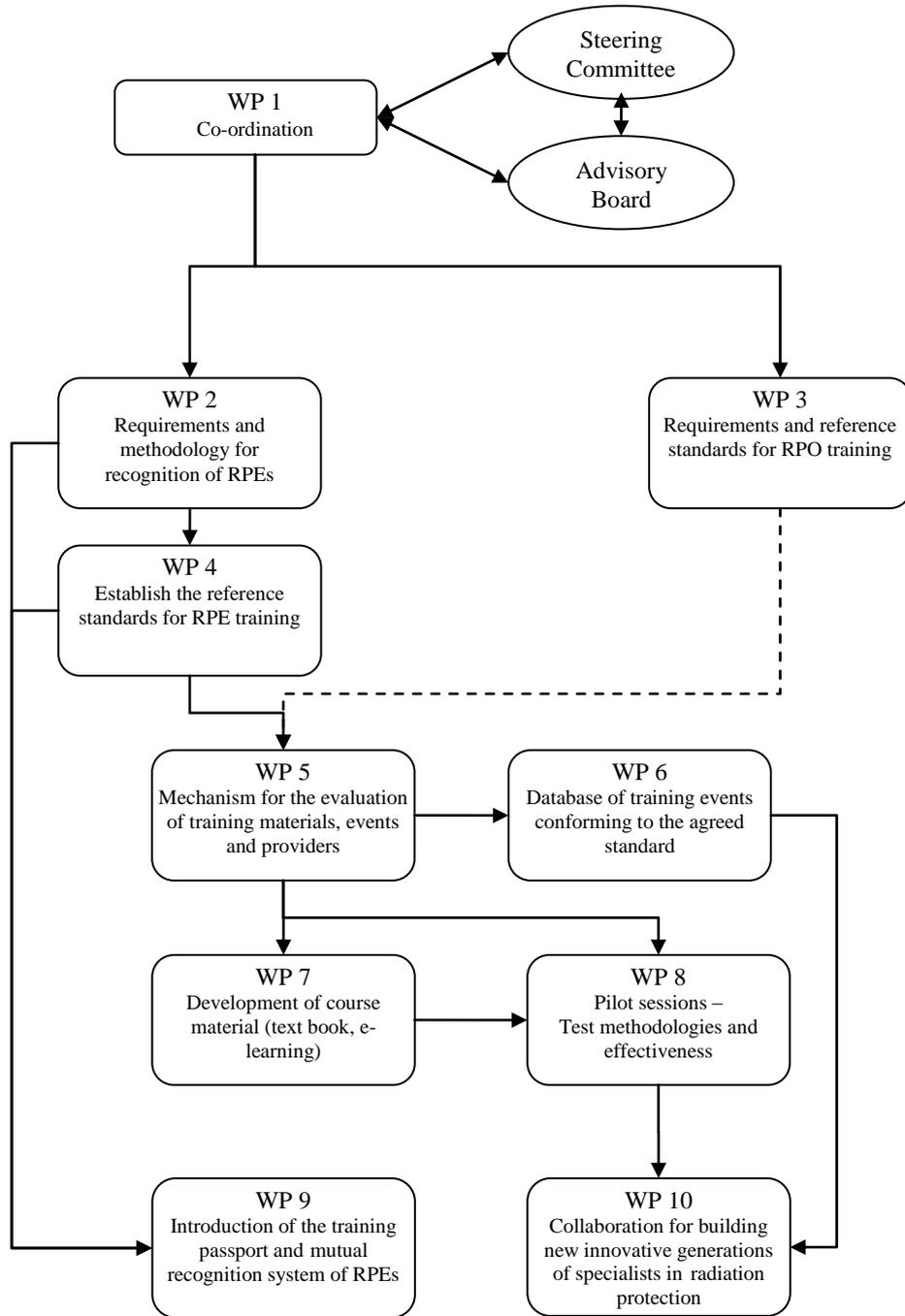
Occupational Radiation Protection: Specificities of Waste Management and Decommissioning, Germany

The ultimate goal of the ENETRAP II project is the introduction of a European mutual recognition system for RPEs. In WP9 coordinating actions will be undertaken to establish such a system. Furthermore, the European training passport will be introduced as a tool for facilitating an efficient and transparent mutual recognition system.

Whenever possible, a collaboration will be established with the "training" Working Groups of the three EU "platforms" that were launched in 2007 (in particular, to discuss the added value of a "European training / skills Passport" and the balance between theoretical and practical training that is desired to improve both the quality and the mobility of nuclear experts in public as well as private sector): SNE-TP, ENEF and HLG.

Last but not least, within WP10, ENETRAP II foresees in the attraction of young people to the application fields of ionising radiation and radiation protection. Those people who developed concepts in radiation protection and held leadership positions at universities and research institutions to further develop radiation research and educate and train the next generation in Europe are retired or starting to retire. We are facing the same situation for numerous radiation protection experts and officers who devoted their knowledge and experience to build up a high level of radiation safety and security in all radiation applications in industry, medicine and research in Europe. In order to maintain this high level and to further develop a European safety culture, it is necessary to attract more young people by awakening their interest in radiation applications and radiation protection already during their

schooldays and later on during their out-of-school education (university or vocational education and training). More young people must be inspired to take an interest in radiation research and prepared to take leadership positions at universities and radiation applications in industry, medicine and research in Europe. Radiation protection experts, in particular, work more and more on a European level. Therefore, tomorrow's leaders must have an international perspective and must know their colleagues in other countries. That's why it is important bringing together all the national initiatives at a European level. A collaboration with several national (and the European) nuclear young-generation networks will be established.



## **Management structure and procedures**

### Co-ordination

The project will be co-ordinated by SCK•CEN. SCK•CEN will appoint a project manager who will assume operational responsibility for the project and all co-ordination activities. The project manager will also be responsible for all communication with the EC.

Furthermore, the project management objectives are to ensure:

- the co-operation of the Consortium partners in achieving the aims of the ENETRAP II work packages;
- the quality of the deliverables as well as the completion on time and budget;
- that the results of the ENETRAP II work packages are disseminated to all EU Member, New Member States and Candidate countries and

### The Steering Committee

The project manager will be supported by a Steering Committee, consisting of the Consortium partners. Each partner will appoint a senior expert with relevant expertise in radiation protection education and training, as the person in charge for this project. This expert will participate in the Steering Committee. The Steering Committee will hold meetings at least twice a year, chaired by the project manager. The Steering Committee will also establish an Advisory Board.

### Advisory Board

The composition of the Advisory Board is such that all relevant stakeholders, with respect to the stated aim of the project, are represented, i.e. regulatory authorities, international organisations, professional organisations, training providers, research institutes, medicine and industry. The Advisory Board will advise about the best balance between supply and needs of training, thereby ensuring stable feedback mechanisms to the Steering Committee. The Advisory Board will meet at least once a year; this meeting will be combined with a Steering Committee meeting.

### Consortium as a whole

The Consortium counts 12 partners, the bulk are training providers such as research centres or other training institutions. All of them have thorough experience in the field of training in radiation protection at different levels and in different sectors. Staff members of the different partners who play a key role in this project, have also proven to be highly involved with E&T matters, on national and international levels, and are member of several E&T networks. Connections to international organisations such as the IAEA, EUTERP, IRPA, WENRA, etc are guaranteed.

Most partners also have an advisory role towards the national regulatory authority.

The presence of the ENEN Association within the Consortium, taking the role of work package leader of the important WP9, ensures the close collaboration of the different European Networks, ultimately facilitating a European Education and Training Network dealing with both education and training activities in the nuclear field such as nuclear engineering, radiation protection and other nuclear areas.

Together with the members of the Advisory Board the major part of all future employers is connected to this project.

**List of partners**

<b>Partner Number</b>	<b>Name</b>	<b>Short name</b>	<b>Country</b>
1	Studiecentrum voor Kernenergie•Centre d'Etude de l'Energie Nucléaire	SCK•CEN	Belgium
2	French Atomic Energy Commission (Commissariat à l'énergie atomique)	CEA	France
3	KIT Karlsruhe Institute of Technology	KIT	Germany
4	Federal Office for Radiation Protection (Bundesamt für Strahlenschutz)	BfS	Germany
5	Italian National Agency for New Technology, Energy and Environment	ENEA	Italy
6	Nuclear Research & consultancy Group	NRG	The Netherlands
7	Spanish Research Centre for Energy, Environment and Technology	CIEMAT	Spain
8	Health Protection Agency	HPA-CRCE	United Kingdom
9	European Nuclear Education Network Association	ENEN	France
10	Nuclear and Technological Institute	ITN	Portugal
11	Budapest University of Technology and Economics Institute of Nuclear Techniques	BME-NTI	Hungary
12	University Politehnica of Bucharest	UPB	Romania