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European Learning Initiatives for Nuclear Decommissioning and Environmental Remediation

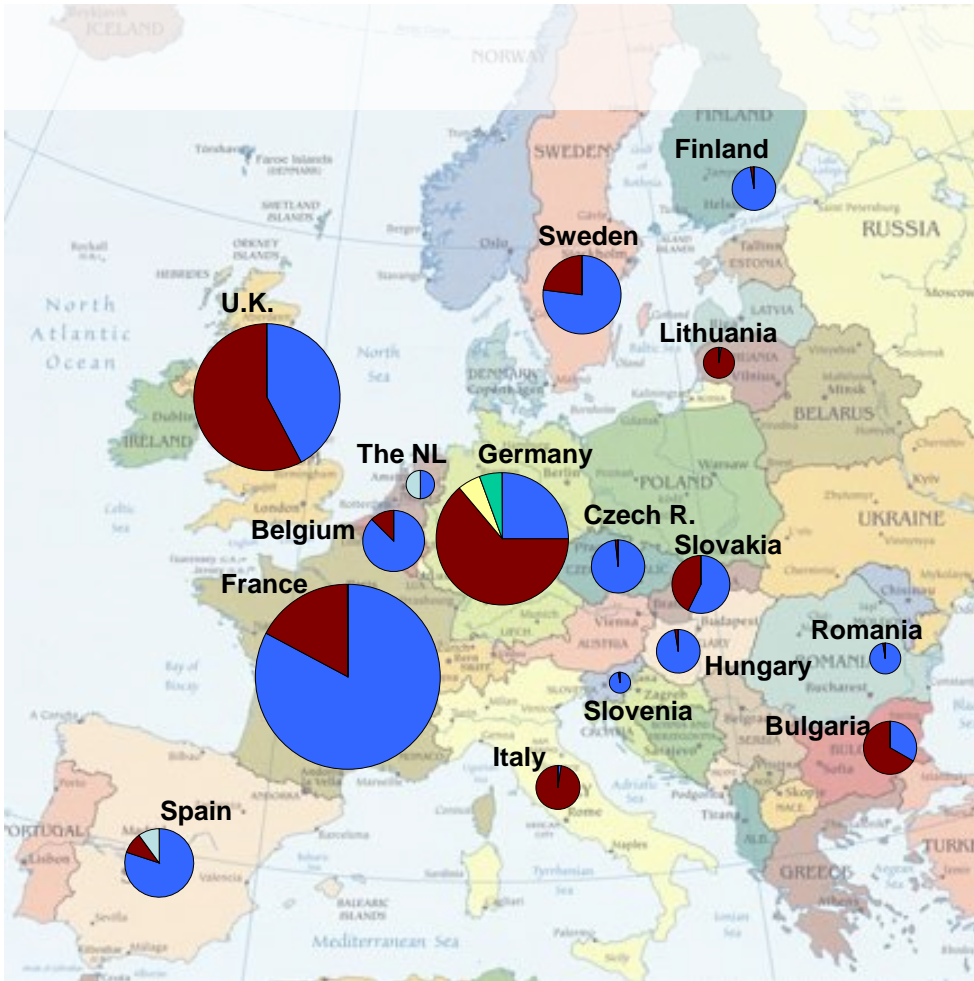
EC Joint Research Centre - Sites

Headquarters in Brussels
and research facilities located
in **5 Member States:**

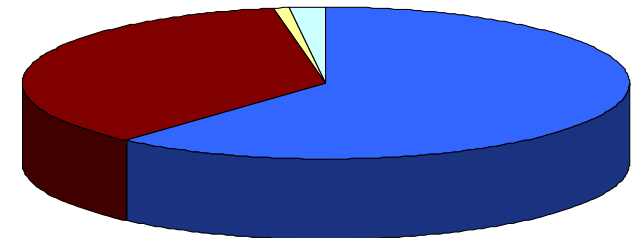
- Belgium (Geel)
- Germany (Karlsruhe)
- Italy (Ispra)
- The Netherlands (Petten)
- Spain (Seville)



Situation nuclear power reactors in the EU



- Operational
- Shutdown - Dismantling
- Fully Dismantled
- Long Term Safe Enclosure



TOTAL
Power reactors in EU: 222
Operating reactors: 131

Situation nuclear decommissioning in the EU

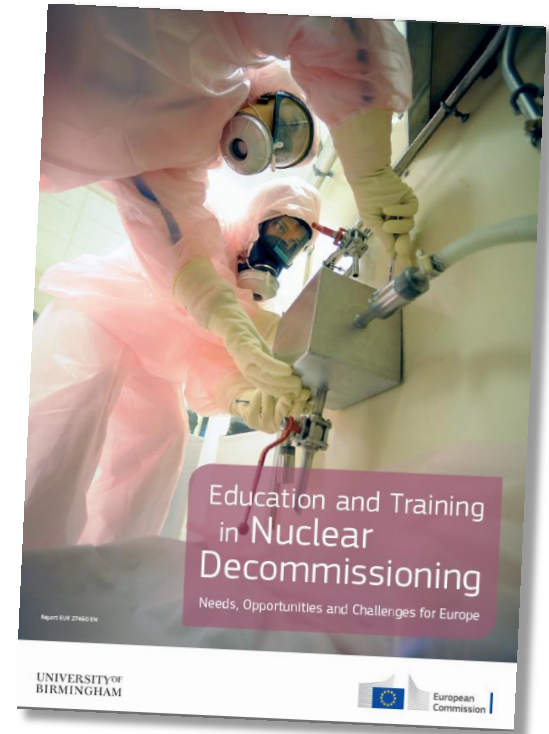
- *Demonstration of decommissioning at an industrial scale, as a 'last but feasible step' of the nuclear life-cycle, is essential for the **credibility** of the nuclear energy option*
- *Decommissioning market expected to **expand**, particularly in Europe*
- *Currently, an industrial experience exist, however...
... further attention is necessary for:*
 - ✓ Development of the most suitable **techniques**, with respect to safety, efficiency and waste limitation
 - ✓ **Standardisation** and harmonisation (incl. cost estimation)
 - ✓ Offering and promoting dedicated **education and training opportunities**
 - ✓ **Sharing** knowledge and experiences

Offering and promoting dedicated Education and Training (E&T) opportunities

JRC organised jointly with the University of Birmingham in April 2015 a seminar on Education and Training in Nuclear Decommissioning, in an attempt to answer to the questions:

- **What are the E&T needs ?**
 - **What are the opportunities, what does already exist ?**
 - **How can we attract young talent ?**
- Outcome of the seminar is published in a joint report with orientations on the way forward to support Education and Training in Nuclear Decommissioning in the EU.

<https://ec.europa.eu/jrc/en/publication/education-and-training-nuclear-decommissioning-needs-opportunities-and-challenges-europe>



Competences in nuclear decommissioning

What are E&T the needs ?

- Large need of competences, not only technical but also financial, juridical, social , ...

- Main identified 'Pinch Point' areas for nuclear decommissioning

- ❖ Programme and Project Managers
- ❖ Engineers specialised in Decontamination & Dismantling Techniques and in Waste Management
- ❖ Safety Case/ Licensing Specialists
- ❖ Radiological Protection Advisors
- ❖ Radiation Metrologists and Radiochemists
- ❖ Skilled technicians and operators for dedicated equipment

What are the E&T opportunities?

Examples of EDUCATION in decommissioning:

- **PhD/Professorships** in decommissioning (e.g. 'Professorship on Decommissioning of Conventional and Nuclear Facilities' at KIT, D)
- **2/3 y postgraduate Masters courses** on decommissioning (e.g. 'MSc in nuclear decommissioning and waste management' UoB, UK, or 'ITDD Master – ingénierie, traçabilité et développement durable', France)
- **Dedicated modules** in decommissioning integrated in a more general master course
- **Bachelor degrees** with specialisation of about 1 y in decommissioning (e.g. Universities of Caen and Nîmes, France)

What are the E&T opportunities?

Examples of vocational TRAINING in decommissioning:

- JRC ' Summer School on Nuclear Decommissioning and Waste Management' (1week, on the JRC-Ispra site, I)
- 'Technology and Management of the Decommissioning of Nuclear Facilities' course at the AREVA Nuclear Professional School (1 week by the Karlsruhe Institute of Technology (KIT), D)
- Belgian Nuclear Research Centre courses on 'Decommissioning of Nuclear Installations' (1week open courses and customized courses at the SCK•CEN site, Mol, B)
- 'European Decommissioning Academy' organised by the Slovak University of Technology (3weeks of courses, on-site training and technical tours in Austria, Switzerland and Italy)
- CEA/INSTN international course on 'Dismantling Experience of Nuclear Facilities' (1week, including a tour of dismantling sites)
- IAEA ad hoc training programmes and possibilities for e-learning

What are the E&T opportunities?

With expansion of E&T opportunities attention should be paid for:

- harmonisation of the education and training outcomes,
- further enhancing the collaboration with all participants involved in decommissioning (industry, safety authorities and associated technical support organisations, waste management and decommissioning agencies, research centres).

How can we stimulate interest and future talent?

The JOB...

- 👎 'Breaking down' is not a very attractive occupation for me, I would prefer building something new!
- 👎 Why do I need to take care of the negative 'nuclear heritage' left by the others?
- 👎 At the end.. there is 'nothing'.
What will then happen with my job?



How can we stimulate interest and future talent?

The JOB...

- 👍 Decommissioning is in reality **much more** than clearing, cleaning and demolishing; decommissioning projects usually present an appealing technological challenge, requiring creative solutions.
- 👍 Decommissioning is an emerging activity involving on the average young people; related jobs offer many possibilities for **career development**.
- 👍 Decommissioning offers also tremendous opportunities for people who have developed expertise in reliable technologies or experience in managing projects and who are interested in **mobility**.
- 👍 A job in decommissioning is, in general, **secure**; young engineers and scientists graduating after studies dedicated to decommissioning are almost certain to find a job.
- 👍 Actually, decommissioning provides a service to society and can be considered as a **'noble cause'**: decommissioning is aiming to restore a safe environment and demonstrates that closing the nuclear energy cycle is feasible.

How can we stimulate interest and future talent?

*Promotion could start by **clarifying** the existing education, training and career opportunities in Europe.*

***Advertising the challenge** linked to decommissioning could be stimulated and integrated within existing campaigns for the promotion of education and training.*

*And more generally, promotion of decommissioning could be helped by improving the **public understanding on its finality** and as such presenting the activity in a more objective way.*

ELINDER

"European Learning Initiatives for Nuclear Decommissioning and Environmental Remediation"

Purpose:

Stimulate vocational training in nuclear decommissioning in the EU, by:

- creating a European 'pool of training initiatives' offering at different locations a series of courses, visits and practical studies;
- organised in complementing modules, reducing duplication;
- harmonizing and clarifying the learning outcomes;
- offering an EU 'quality label' or 'endorsement' to those initiatives contributing to qualitative competence building in decommissioning and waste management.

ELINDER Project

Approach:

- Training split in (1-2 week) complementing modules, at different locations
- Qualified '**Generic course**' (General Introduction to Decommissioning) and '**Specific course modules**':
 - 1 Metrology for Waste Characterisation and Clearance
 - 2 Decontamination and Dismantling Techniques
 - 3 Waste and Material Management
 - 4 Decommissioning Planning and Cost Assessment
 - 5 Safety, Licensing and Environmental Impact Assessment
 - 6 Decommissioning Programme and Project Management
 - 7 Environmental Remediation and Site Release
- Complemented with '**e-Learning course**' (Induction to Nuclear)

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Audience:

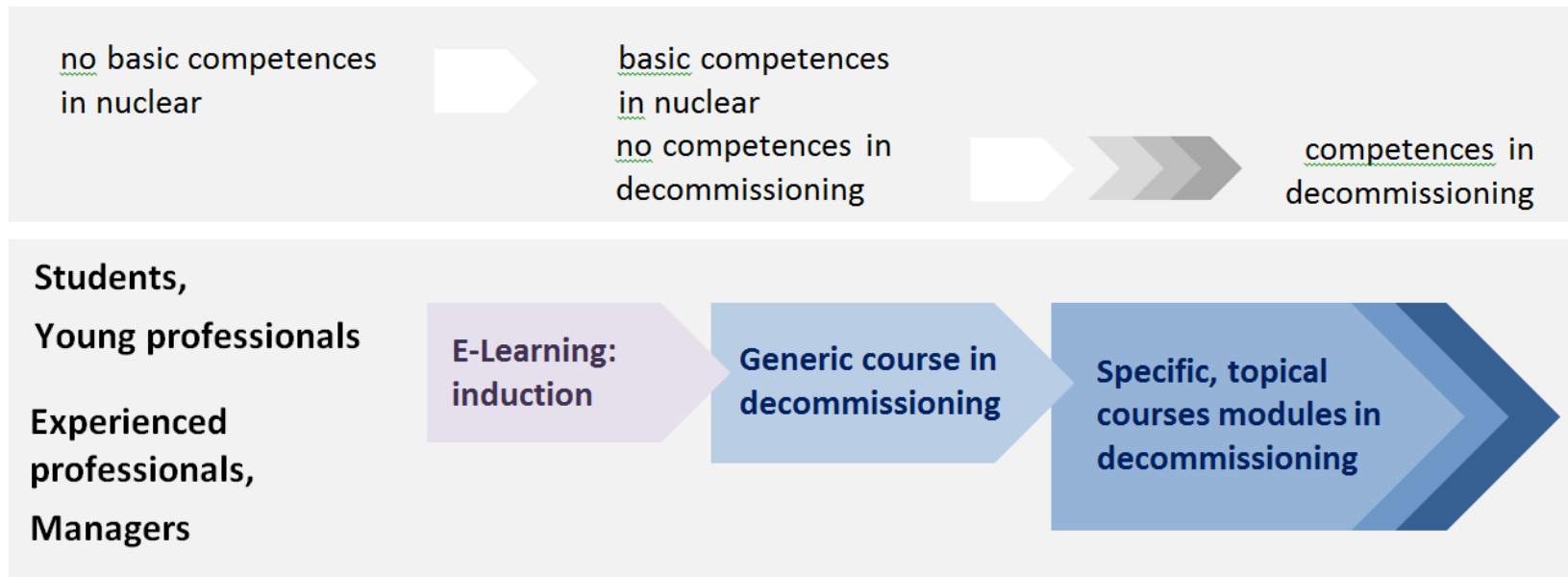
Professionals with higher education diploma ("EQF 6, 7 or 8")

Target:

- professionals who have acquired experience in the nuclear sector but who re-focus their career to nuclear decommissioning projects
- professionals who have experience with a non-nuclear industrial sector but who re-focus their career to nuclear decommissioning projects, after having followed an induction training to the nuclear domain
- professionals with already experience in decommissioning and waste management, but who want to acquire more in-depth knowledge on the subject

ELINDER Project

Stepwise improvement level of Competences



ELINDER Project

Benefits from a joint European approach:

- **Visibility and clarity:**

- possibility to **promote** the training by joint advertising to interested employers/trainees,
- enhanced clarity for the employers and interested trainees on the **outcomes and quality** of the anticipated training;

- **Synergies:**

- possibility **sharing** of courses, teachers or facilities to visit
- reducing organisational burden and maximising output using **common** tools and databases, including also IAEA tools, making the training more relevant and up-to-date
- maximising the use of the **expertise** available in each of the training organisations (particularly for the specific modules)

- **Increased opportunities:**

- possibility for trainees to **gradually** develop expertise by combining (over the years) different modules;
- possibility to integrate also **(funded) trainees** from third countries

ELINDER Project

Qualification of the programme:

- I. Defining a system for qualification of ELINDER courses**
 - Definition of minimum criteria for a qualified course under ELINDER
 - Setting up a committee for ensuring the qualification of courses

- II. Development of ECVET competence-based qualification system in decommissioning**
 - Development of 'Job Taxonomy' in nuclear decommissioning ; designing qualifications and related learning outcomes for nuclear decommissioning
 - Adapting training programme accordingly
 - Determination of a future certification organisation for VET in nuclear decommissioning

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Partners (MoU):

- ❖ CEA, France
- ❖ KIT, Germany
- ❖ University of Birmingham, UK
- ❖ STUBA, Slovakia
- ❖ SCK•CEN, Belgium
- ❖ UTARTU, Estonia
- ❖ NUVIA, Europe
- ❖ SOGIN, Italy
- ❖ ENEN
- ❖ ENSTTI
- ❖ ENS
- ❖ FORATOM
- ❖ JRC, EC

+ IAEA
Practical Arrangements

+ *other "Involved Actors"*

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Planning (1/2):

2017: preparation actions:

- definition of minimum criteria for qualification of ELINDER courses,
- development course programme
- definition of suitable introduction e-learning courses
- further outreach and promotion ELINDER programme

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Planning (2/2):

2018 and beyond: implementation and gradual improvements:

- implementation courses, target:
 - 6 generic courses / 3 years
 - 14 specific courses / 3 years
- preparation for ECVET application
- e-learning: additional ad hoc courses to support the programme
- outreach, experience feedback, improvement programme

Roundtable:

"Supporting European Expertise in Nuclear Decommissioning"

23rd January 2018, Brussels

How to apply?

- **Detailed information on the schedule of the courses and the application procedure will be soon published on the ELINDER Webpage on the JRC Website**

<https://ec.europa.eu/jrc/en/training-programme/training-experts-nuclear-decommissioning-european-learning-initiatives-nuclear-decommissioning-and>



**THANK YOU
FOR
YOUR ATTENTION**

