Initiatives of the Belgian SCK•CEN Academy to attract young talent in nuclear research and technology

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Belgian Nuclear Research Center is a foundation of public utility

- 1952, cradle of nuclear research, applications and energy development in Belgium
- major international player in the field of nuclear R&D
- today: ~700 staff, >50% with academic degree + 65 PhD students
- annual turnover: 140 M€
  - 45% government support
  - 55% contract work
SCK•CEN Academy

SCK•CEN = research center
- > 60 years of experience in nuclear research and technology
- Most recent knowledge and development
- Innovative projects
- Availability of large and unique nuclear facilities

SCK•CEN = education and training center
- °2012: SCK•CEN Academy for Nuclear Science and Technology, coordinates all E&T activities, in broadest sense
- Major nuclear training provider in Belgium, complementary to universities
1. **Guidance young researchers**
   - Thesis (PhD, Master, Bachelor level), post-docs, internships, visits for students, (CPD – scientific visitors)

2. **Organization of courses**
   - Academic courses for students
   - Customized training for professionals

3. **Policy support with regard to E&T matters**
   - European Framework Programs, expert groups IAEA, OECD, EHRO-N, ENEN Association, ...

4. **Caring for critical-intellectual capacities**
   - Scientific/technical + context! (philosophical, ethical, economical, political, ...)
Support young students in their need to gain and maintain high-level nuclear knowledge

Three highlighted topics for this presentation:

- supervising young students from Bachelor to PhD level

- contributing to academic courses like the ones of the Belgian Nuclear higher Education Network (BNEN), the Radiation Protection Expert (RPE) course and others

- familiarizing high school pupils and their teachers with the state of the art of nuclear research and with the daily activities performed at our research center
Your thesis/internship @ SCK•CEN

- Scientific topics determined by SCK•CEN mentors, within the priority R&D of our research center
  - (also more general topics in supporting disciplines e.g. office management, ICT, ... – lower levels, local schools)

- Published on Academy website after approval process

- Application: submission of candidates’ file via the website

- Selection procedure
  - Straightforward for Bachelor/Master/internship
  - More complex/demanding for PhD and post-doc positions
Financial support by SCK•CEN for Bachelor/Master/internship is limited
- Limited to monthly allowance + cheap housing (dormitory) in specific cases

Nevertheless, we receive about 80 students on annual basis

Few weeks – few months

From Belgium and abroad

They are guided by our experts, in close collaboration with the university promoter, make use of nuclear installations

Annual award “best Master thesis”

Few of them proceed with PhD research
PhD / post-doc program exists since 1992, “boosted” in 2006

Growth in number since 2006, mainly due to more involvement of third parties: FWO/FNRS, IWT, Belspo, ESA, 7FP, industry, ...

Dedicated pro-active search for external finances more and more important / difficult
  - Collaboration
  - Sponsoring
PhD's: 170 started, 79 finished PhD's, 45 stayed at SCK•CEN (status May 1st, 2014)
In conclusion

Currently, about 80 Bachelor/Master/internships and 65 PhD students are performing their research on a topic of SCK•CEN. Successful PhD students can apply for a limited number of post-doc positions at SCK•CEN, or a permanent position.

We work closely together with Belgian and international universities, and with end-users (industry, medical sector, ...).

Organization of “Day of the PhD”s and other events for SCK•CEN PhD’s: cross-polonization, transdisciplinarity.

This combination provides an exceptional learning opportunity: students stay in close contact with the academic world + they enjoy a unique international research environment.
The Academy organizes courses in all research topics of SCK•CEN:
- Radiation protection, nuclear technology, nuclear materials issues, emergency management, decommissioning and decontamination techniques, waste and disposal issues, nuclear safety, safety culture, safeguards, nuclear security, ethical aspects, nuclear technology assessment, ...

Took initiatives to start cooperation in order to increase students and make nuclear education more attractive
- BNEN
- RPE course
“Master-after-Master” degree of 60 ECTS, in English

°2002, BNEN program intends to remodel the nuclear education in Belgium, catalyze networking between academia, research centers, public utilities, etc.

Organized by 6 Belgian universities and SCK•CEN, support from industry

Venue: SCK•CEN

Modular → allows for optimal time management for teachers and students; facilitates individual participation in selected courses and foreign students participation in blocs of courses (ENEN program)
- About 10-15 new students (full program) each year
- Total about 75 graduates
Post-graduate course for Radiation Protection Expert

- In line with legal requirements for RPE
- 2003, 20 ECTS, in Dutch and French
Other contributions to education

- European Master in Radiation Protection
- European Master in Radiation Biology
- Summer school in Radiation Biology
- Contributions to Erasmus programs like SPERANSA / SARA (CHERNE Network)
- Founding member of the ENEN Association
- Some of our scientists/engineers are part-time professor at university
- ...

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Pupils

- Last year(s) of high school – 17/18 years old
- Wide attention span, eager to learn, curious
- Start to realize complexity of certain issues
- Develop an open and critical mind in order to gain more insight in risks and benefits of radioactivity and nuclear technology

Teachers

- (one of) First source of information to pupils
- Need to understand very well, before being able to transfer knowledge
  - Understand technical/scientific part; have most recent information
  - Be able to deal with the societal debate
Our aim

- Explain/refresh basics of radioactivity
- Discuss several examples of nuclear applications
  - In nuclear, medical, non-nuclear industry, daily life, ...
- Present research activities of SCK•CEN, justify why nuclear research is important, how does it contribute to well-being of society in general
- Discuss with teachers how the standard education programs can integrate a pluralistic approach to complex technical issues such as applications of radioactivity
3 tools

1. Dedicated website
   - [http://jongeren.sckcen.be](http://jongeren.sckcen.be)
   - In Dutch and French

2. Thematic guided tours at SCK•CEN
   - Four generations of nuclear reactors
   - Radiation in space
   - Radioactive waste and disposal
   - Reactor technology – from idea to practice

3. Workshops for teachers ("teacher’s days")
   - “four generations of nuclear reactors”
   - “your daily portion of radioactivity: from sea-level to space”
   - ...
For all above mentioned activities the Academy can count on a pool of about 100 top-level scientists, engineers and technicians of SCK•CEN who all bring insights and ideas from their specific background and transfer this to the next generation.

Next to the scientific and technical issues, attention is given to practical exercises and “real-life” situations.

Attention is also given to the societal aspects of nuclear applications. With this approach we aim at providing pupils, students and early-stage researchers insight in the wider context of nuclear applications.

- Ethical aspects of radiological risk
- Nuclear technology assessment
- Organization of reflection groups
Conclusions

- Focus on knowledge, understanding, skills, attitudes, ... and show “real-life” situations = added value

- Mention the whole picture:
  - ALL application fields, ALL issues

- Motivate to choose for scientific or technical studies can be one aim, but equally (or more) important: discuss risks and benefits of nuclear applications in general, develop an open and critical mind in order to gain more insight in multi-facetted issues such as risks and benefits of radioactivity and nuclear technology, and contribute in serene way to the societal debate

- Contribution to critical-intellectual nuclear capacities for society