Incentives and justification

- European Council (2008): '...it is essential to maintain in the EU a high level of training in the nuclear field.'
- G8 Summit (2009): 'E&T in the field of Nuclear S&T is a key component of the nuclear infrastructure worldwide.'
- SNETP (2010): 'Nuclear E&T: key element of a sustainable European strategy'.
- The GENTLE Coordination and Support Action (FP7)
Objective

- To create a sustainable lifelong E&T programme in the field of Nuclear Fission Technology that meets the needs of the European stakeholders from industry, research and technical safety organisations

GENTLE Partners
GENTLE Stakeholders

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Type</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>AREVA</td>
<td>Industry</td>
<td>France</td>
</tr>
<tr>
<td>Compania Nationala a Uraniului</td>
<td>Industry</td>
<td>Romania</td>
</tr>
<tr>
<td>Eesti Energia</td>
<td>Utility</td>
<td>Estonia</td>
</tr>
<tr>
<td>ENS</td>
<td>Association</td>
<td>International</td>
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<tr>
<td>ENEN</td>
<td>Education</td>
<td>International</td>
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<td>Foratom</td>
<td>Industry Association</td>
<td>International</td>
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<td>NNL</td>
<td>Research &amp; consultancy</td>
<td>UK</td>
</tr>
<tr>
<td>NRG</td>
<td>Research &amp; consultancy</td>
<td>Netherlands</td>
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<tr>
<td>NUGENIA</td>
<td>Association</td>
<td>International</td>
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<tr>
<td>SNE-TP</td>
<td>International</td>
<td>International</td>
</tr>
<tr>
<td>TVO</td>
<td>Utility</td>
<td>Finland</td>
</tr>
<tr>
<td>Urenco</td>
<td>Industry</td>
<td>Netherlands</td>
</tr>
<tr>
<td>Westinghouse</td>
<td>Industry</td>
<td>Sweden</td>
</tr>
</tbody>
</table>

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Gentle Tools

- Student Research Projects (SRPs) to facilitate students to get hands-on experience in Europe's unique and specialised laboratories
- Inter-Semester Courses (ISCs) for graduate and post graduate students, including special industry related topics
- A Professional Education Program (PEP) for young professionals working to enhance their knowledge of nuclear reactors and fuel cycles
OPPORTUNITIES FOR STUDENT MOBILITY

- GENTLE supports students mobility within Europe through dedicated grants. The grants are for MSc, BSc theses, external stages within PhD projects, etc. in universities and research facilities which are not in the same domicile as the University at which the students are registered.

- The duration of the grants can be from 1 up to 24 months

- Open posts, in different scientific fields (nuclear fuel, nuclear data, neutronics, thermal-hydraulics, etc.) are published on the GENTLE web page. Moreover, students can propose own research projects and Internships.

Inter Semester Courses

<table>
<thead>
<tr>
<th>Name</th>
<th>Partner</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nuclear Data</td>
<td>UPM / JRC-IRMM</td>
<td>June 2014</td>
</tr>
<tr>
<td>Safeguards and Security</td>
<td>SCK-CEN</td>
<td>July 2014</td>
</tr>
<tr>
<td>Reactor Techniques</td>
<td>BME</td>
<td>Feb 2015</td>
</tr>
<tr>
<td>Thermal Hydraulic Phenomena</td>
<td>LUT</td>
<td>April 2015</td>
</tr>
<tr>
<td>Nuclear Fuels</td>
<td>JRC-ITU</td>
<td>July 2015</td>
</tr>
<tr>
<td>Nuclear Waste Management</td>
<td>KIT / JRC-ITU</td>
<td>July 2015</td>
</tr>
<tr>
<td>Nuclear Decommissioning</td>
<td>UMAN</td>
<td>Sep 2015</td>
</tr>
</tbody>
</table>
**GENTLE Work Packages**

<table>
<thead>
<tr>
<th>WP1</th>
<th>Management and Coordination</th>
</tr>
</thead>
<tbody>
<tr>
<td>WP2</td>
<td>'Student Research Experiences'</td>
</tr>
<tr>
<td>WP3</td>
<td>'Inter-Semester Courses'</td>
</tr>
<tr>
<td>WP4</td>
<td>Preparation of the 'Professional Education Programme on Nuclear Energy'</td>
</tr>
<tr>
<td>WP5</td>
<td>Pilot of the 'Professional Education Programme on Nuclear Energy'</td>
</tr>
<tr>
<td>WP6</td>
<td>Dissemination and integration</td>
</tr>
</tbody>
</table>

For young professionals entering the domain of nuclear energy from other domains.

For training and teaching of skills in nuclear R&D special topics not part of the academic curriculum.

**Professional Education Programme**

- Consists of 5 two-week modules (spread over 2015 & 2016) on the following topics:
  - Mod1: Understanding nuclear power
  - Mod2: Producing energy with nuclear reactors
  - Mod3: Nuclear fuel from ore to waste
  - Mod4: Societal justification, safety and security of nuclear energy
  - Mod5: Management systems

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PEP: content (1)

- Mod1: **Understanding nuclear power**, TU Delft (Delft), June 2015
  - Societal, economical and technical perspectives on nuclear energy
  - Fundamentals of nuclear science, nuclear chemistry, thermal hydraulics, radiation protection and nuclear reactor physics
  - Nuclear fuel cycle and waste management

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PEP: content (2)

- Mod2: **Producing energy with nuclear reactors**, KIT (Karlsruhe), October 2015
  - Principles of energy generation with nuclear reactors
  - LWR systems (PWR, VVER, BWR)
  - Operational aspects of PWR
  - Fundamentals of neutron physical and thermal hydraulic core design
  - Dynamic behaviour of LWRs
  - 1-day visit of training reactor of IKE, Stuttgart

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PEP: content (3)

- **Mod3**: *Nuclear fuel from ore to waste*, ITU (Karlsruhe), February 2016
  - Fundamentals of actinides chemistry & physics
  - Where does nuclear fuel come from?
  - How does it behave in the reactor?
  - What to do with used nuclear fuel afterwards?
  - Existing technologies and future developments
  - Different lab visits (fuel preparation, hot-cells, vitrification lab, waste management)

PEP: content (4)

- **Mod4**: *Societal justification, safety and security of nuclear energy*, SCK•CEN (Mol), April 2016
  - Science, politics and ethics of nuclear technology assessment
  - Nuclear safeguards and security aspects
  - Nuclear safety aspects (deterministic and probabilistic approaches)
  - Nuclear safety culture and methodologies for safety assessment
  - Decommissioning of nuclear plants
PEP: content (5)

- Mod5: Management systems, CIRTEN (Milano), June 2016
  - Quality management principles
  - Project management issues
  - General soft skills
  - Insights into the interaction processes with Safety Authorities and Regulatory Bodies

PEP: other issues

- Study load: 8 ECTS credits / module
  - 80 lecture hours / module
  - 140 hours / module for preparation, distant learning, homework
- Tuition fee (pilot): ALL IN (= books, access to student facilities, excursions, hotel and all meals)
  - 18 000,- € pp. for the complete programme
  - 3 600,- € pp. per module
  - Not included: travel to and from lecture locations
WHY APPLY?

- This education programme is **UNIQUE** in the nuclear E&T:
  - Organised by 11 leading academic and research institutions
  - Offers truly international networking possibilities
  - Covers broad and complete scope of nuclear topics
  - Includes practical trainings
  - Includes visits to unique state-of-the-art nuclear facilities

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