Brussels, March 07, 2025

Subject: **Position Paper – European Nuclear Education Network**

European approach to nuclear education and training in support for ensuring enough qualified persons necessary for nuclear industries and nuclear related industries

Summary

The European Nuclear Education Network (ENEN) underscores the critical need for a well-trained and highly qualified workforce to sustain and advance the nuclear sector in Europe. The increasing demand for nuclear professionals is driven by several converging factors, including an aging workforce, the need to extend the operational life of existing nuclear power plants, the deployment of new nuclear facilities, and the emergence of advanced nuclear technologies such as Small Modular Reactors (SMRs) and Generation IV reactors together with the multitude of other industries that use ionizing radiation.

To address these challenges, ENEN advocates for the following key actions:

1. **Ensuring Mobility and Access to Research Infrastructures** – Facilitating international mobility for students, researchers, and young professionals is essential to foster career development and enhance cross-border collaboration.
2. **Attracting New Talent into the Nuclear Field** – Implementing targeted initiatives such as competitions, career events, and summer schools to encourage students to pursue careers in nuclear science and technology.
3. **Developing a Strategic EU Agenda for Nuclear Education & Training (E&T)** – A coordinated European approach is needed to ensure the sustainability of education and training programs while addressing the workforce gap in various nuclear disciplines. This initiative will also support keeping the existing workforce, a major issue in many countries.
4. **Enhancing Collaboration Between Industry and Academic Institutions** – Strengthening partnerships between academic institutions, research centers, and industry players to ensure that training programs align with real-world industry needs.
5. **Supporting Research and Innovation as a Tool for Competency Development** – Encouraging research as a means to develop cutting-edge techniques and knowledge while integrating senior professionals into training and mentoring roles.
6. **Establishing a Recognized EU-wide Education, Training, and Skills Passport** – This initiative will enable industry stakeholders to efficiently identify and recruit skilled professionals, streamlining workforce development across Europe.
7. **Reinforcing International Cooperation Beyond the EU** – Collaboration with highly developed nuclear countries outside the EU is essential to maintain high-level competencies and best practices.

8. **Support integration of new technologies –** Communities in nuclear education and training can collaborate and contribute to the advance of nuclear technologies

ENEN is committed to acting as the main liaison between the various educational and professional **communities** in **nuclear engineering, safety, radiation protection, medical applications, radioactive waste management, nuclear management, radiochemistry, decommissioning, IT – AI –digitalization of nuclear, nuclear safeguards, and beyond**. Stable and substantial funding for workforce development is essential to ensuring Europe's energy security, clean energy goals, and industrial competitiveness.

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1. ENEN's Role in Nuclear Education and Workforce Development

The European Nuclear Education Network is a key player in fostering a qualified nuclear workforce by connecting academic institutions, research centers, and industry stakeholders. Nuclear Education and Training (E&T) are essential for maintaining the expertise needed in critical areas such as nuclear power plant operation, medical applications, radiochemistry, decommissioning, nuclear safety and safeguards, support for regulators and others.

With its continuous activity for more than 20 years in the field, ENEN should serve as a bridge between academia and actors of the nuclear value chain, ensuring knowledge transfer and skill development across all nuclear-related domains and interface ones (e.g. mechanics, management, electronics, IT, etc.). The organization coordinates various educational and training programs at the European level, enabling attraction of passionate people, knowledge exchange, research collaborations, and professional mobility across borders. By fostering high-quality training programs, ENEN supports the sustainability of nuclear expertise, nuclear safety and nuclear safety culture, ensuring Europe remains at the forefront of nuclear science and technology.

2. Coordination with EU Directorates and the Need for a Unified Strategy

To avoid fragmented efforts in human resource (HR) development, ENEN calls for a structured collaboration between European Commission Directorates General (DG ENER, DG EEAC, DG RTD, DG GROW, DG EMPLOYMENT, etc.) on the topic of the development of the Human Resource (HR). This approach will result in a better cooperation between various DGs while maintaining an open dialogue among them and with the European Society which will result in unified actions, supporting a better projection of the approach to be used for the development of the HR (students, researchers and professionals). The nuclear sector's needs should be addressed through a streamlined and coordinated approach, ensuring that education, training, research, and innovation efforts align with EU energy and security goals.

A unified strategy is essential to maintaining the nuclear workforce's competence across sectors such as nuclear energy, medical technology, space exploration, and industrial applications. The European Commission should support ENEN in acting as the main facilitator of education and training programs, bridging the gap between industry and academia.

3. The Importance of Funding for Human Resource Development

Investment in nuclear E&T must be a priority. ENEN strongly supports provision of continuous financial support in the EU Framework Program related to to education and training. Without a well-financed HR strategy, Europe risks facing an acute shortage of skilled professionals in the nuclear sector, which could impact energy security (e.g. Initiatives under the EU Green Deal), medical advancements, and industrial applications (e.g. initiatives under the Net-Zero Industry Act).

The shortage of nuclear professionals is becoming increasingly critical due to the aging workforce and insufficient recruitment of young professionals. A long-term funding commitment is necessary to sustain and expand the nuclear talent pool. Funding should also be directed toward continuous learning and retraining programs to ensure professionals remain up to date with the latest advancements in nuclear technology.

4. Nuclear Energy's Role in Achieving Europe's Climate Goals

Nuclear energy is a low-carbon source that contributes to Europe's commitment to reducing greenhouse gas emissions by contributing also to the clean energy transition. In addition to power generation, nuclear technology plays a significant role in medical treatments, space exploration, agriculture, food safety and other areas. The EU must continue to prioritize research and innovation in nuclear applications to maintain leadership in these fields.

The integration of nuclear energy into the EU's sustainable energy mix ensures the security of supply and reduces dependence on fossil fuels. The European Commission should actively support nuclear-related education and training projects that promote innovation in reactor designs, fuel cycles, and waste management solutions.

5. Promoting Workforce Mobility Across Europe

ENEN advocates for mobility programs that enable professionals and students to train and work where they are most needed. The free movement of skilled workers within Europe ensures that expertise is efficiently distributed across sectors, addressing workforce shortages in nuclear power, medical applications, and industrial research and optimizing the workforce to follow the implementation of industrial projects across Europe.

Enhanced cooperation between European educational institutions and industrial partners is necessary to facilitate mobility and knowledge exchange. Initiatives such as the ones already implemented by ENEN together with its partners for more than two decades, that have had a major impact on the workforce market, should be continuously supported through a dedicated mechanism. Programs such as the ones implemented by Euratom and Erasmus+ should continue to receive strong support to encourage cross-border training opportunities for nuclear professionals.

6. Strengthening Vocational Education and Training (VET) and Industry Collaboration

ENEN calls for the development of a coordinated EU agenda between education and training institutions and industries, particularly focusing on VET programs. By aligning curricula with industry needs, Europe can produce a workforce that meets evolving technological and regulatory requirements.

The inclusion of hands-on training, internships, and apprenticeships within nuclear education programs is essential to prepare graduates for careers in the industry. Stronger collaboration between universities, research institutes, and companies will facilitate the development of specialized training programs that directly address industry challenges and sets the ground for industrial recognition of acquired competences across EU.

7. Establishing an EU-Wide Education, Training, and Skills "Passport"

To enhance workforce mobility and employability, ENEN supports the creation of a recognized EU-wide education, training, and skills "passport." This initiative would enable industrial actors to efficiently assess a candidate's qualifications, reducing hiring barriers and ensuring a seamless transition from education to employment.

The development of such a skills recognition system would standardize nuclear education and training certifications across EU member states, ensuring that professionals can work across different regulatory environments without additional training burdens.

8. Formal support of EU Cooperation with Developed and Emerging Non-EU Countries

International collaboration is crucial for maintaining Europe's competitive edge in nuclear research and education. ENEN urges the EU to re-establish formal support with developed non-EU countries to facilitate the exchange of knowledge, best practices, and training programs at both researcher and trainer levels.

By fostering partnerships with institutions in developed countries, the EU can ensure that its nuclear workforce remains at the forefront of global advancements in nuclear science and technology.

The EU's support for education and training collaboration in the nuclear field with developing countries is crucial for developing safe, secure, and sustainable nuclear energy programs. As various nations across the globe seek to embark on nuclear energy to address growing energy demands and climate commitments, they often face challenges related to expertise, regulatory frameworks, and operational safety. By providing access to high-quality education, technical training, and research opportunities in Europe, the EU ensures that these countries develop skilled professionals who can implement and run nuclear programs effectively. This approach also promotes inclusivity in global energy transitions, helping to build a diverse, internationally competent workforce. For instance, emerging economies could benefit from European expertise, allowing their engineers and scientists to gain experience in EU research institutions and nuclear facilities before returning to lead national projects. Such cooperation strengthens global nuclear governance, enhances safety culture, and fosters long-term partnerships that benefit both the EU and its partner nations.

9. HR needed for the development of new technologies

The European Commission plays a key role in supporting education and training initiatives essential for the development of innovative nuclear technologies, such as Small Modular Reactors (SMRs) and advanced reactors. These next-generation systems promise enhanced safety, flexibility, and sustainability, but their successful deployment requires a highly skilled workforce with expertise in reactor physics, digitalization, advanced materials, and regulatory adaptation. Through the collaborative frameworks like the ones developed by the nuclear communities in ENEN, the Commission can secure the proper tools fosters knowledge transfer, mobility, and capacity-building among universities, research institutions, and industry stakeholders. By strengthening these educational networks, the EU not only reinforces its leadership in nuclear innovation but also enables a new generation of experts to contribute to the safe and efficient implementation of advanced nuclear solutions across Europe and globally.

CONCLUSION

The sustainability and safety of nuclear-related industries in Europe depends on a highly skilled workforce capable of addressing the evolving challenges of the sector. The shortage of qualified professionals, exacerbated by an aging workforce and expanding nuclear projects, poses a significant risk to energy security and the broader applications of nuclear technology.

To mitigate this challenge, ENEN proposes a multi-faceted approach:

- Strengthening **mobility programs** to facilitate the exchange of expertise.
- Reinforcing the **integration of education within EU-funded research projects** to ensure knowledge transfer to the next generation and new-knowledge sharing across EU.
- Developing **targeted initiatives to attract young talents**, ensuring a continuous influx of new persons into the nuclear field.
- Creation of a recognized, EU wide “skills passport”.
- **Enhancing collaboration** between universities, research centers, and industry to provide relevant training and career pathways.
- Promoting **international cooperation** to maintain and elevate nuclear education and research excellence.

ENEN, with its broad network of European and international stakeholders, is uniquely positioned to coordinate these efforts. By ensuring strategic alignment between industry needs and educational initiatives, ENEN can support the EU’s long-term vision for a sustainable and innovative nuclear sector. Immediate action and dedicated funding are crucial to securing a competent workforce and preserving Europe’s leadership in nuclear science and technology.