

## Why the safe and efficient use of nuclear technology depends on mobile, flexible human capital

- Human capital impacts the entire life cycle of nuclear facilities and operations, and safety performance ultimately depends on human beings. A notable transition is underway as a new generation of nuclear professionals enters the field. Concurrently, in some countries, traditional talent pipelines are weak and in decline.
- The safe use of nuclear technology requires qualified personnel across the entire nuclear community, including operators, regulators, supply chain, and academia. Human capital is a shared responsibility and requires a collective approach.
- Innovation and leadership are critical to the future of nuclear technology. Innovation results from continuous, long-term knowledge investment in human capital and the talent pipeline.
- Attracting and retaining the next generation of nuclear professionals requires a concerted agenda for strategic planning, communications, and stakeholder co-operation across the government, academia and private sector.
- Mobility within the national and international nuclear communities can support human capital development and retention and helps to invigorate all sectors of the nuclear ecosystem. Mobility also accelerates knowledge transfer, builds social competence and teamwork, and contributes to the nuclear industry as an attractive working environment that fosters collaboration. To this end, internationally recognised qualifications for the mutual recognition of nuclear skills could facilitate mobility.

While the design and operating culture of nuclear power plants may differ globally, the safe application of nuclear technology relies on the education and training of human beings. Human capital affects the nuclear life cycle in its entirety, from research and development, operations, to refurbishment projects, decommissioning and dismantling, waste management, and supply chain. Therefore, the sector's success relies on investing in human capital and fostering innovation.

The nuclear sector's human capital has aged more rapidly than its power stations, whose life cycles can be a century from development to decommissioning. This lengthy timeline necessitates decades-long knowledge management. As a new generation of nuclear professionals enters the field, the nuclear community must groom experienced, knowledgeable leaders.

The safe operation of nuclear installations and innovation in nuclear technology depends on qualified and experienced personnel. Like the plants themselves, human capital is not a one-time investment, but is an ongoing commitment. Talent development is essential to sustain

high safety performance and to nurture a culture of continuous improvement. In addition, developing well-informed leaders builds organisational resilience and facilitates growth and the drive towards excellence.

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Nuclear expertise could be shared more broadly, between organisations and countries, and made transferable. At the same time, we also need to have confidence that nuclear workers have the right expertise and experience. We need to ask, ***How do you evaluate these skills?***

William D. Magwood, IV  
Director-General, NEA

## Key considerations regarding human capital

Evolving labour trends and new human capital challenges necessitate that the nuclear community focus on short- and long-term human capital investments, as part of their core priorities to meet their strategic objectives.

**Fostering leaders and high-performing teams:** To ensure commitment to nuclear safety, well-qualified management with a clear vision and objectives is essential.

- How to build an integrated picture of leadership?
- How to prioritise the social competence necessary for high-performing teams and knowledge transfer?
- How to build resilient teams, strong leadership, and robust collaboration?
- How to create the right environment in order to produce desirable behaviour?

**Attracting and retaining qualified personnel:** Safe and cost-effective production of nuclear energy over the long-term relies on human capital and knowledge management.

- What nuclear-specific skills are needed and how can they be evaluated? How to identify non-traditional but qualified profiles?
- How to develop and challenge people, so that they stay and become leader in the nuclear community instead of leaving?
- Is the diversity of nuclear careers communicated effectively to students and young professionals?

**Promoting cultures of innovation and safety:** The ultimate objective of investing in human capital is to enhance the capacity and capability to operate nuclear reactors safely and efficiently. Safety is the overriding priority and drives every other consideration.

- How to build a self-reinforcing culture in which innovation and safety are joined-up and synergised?
- How will digitalisation change the nuclear industry?

**Mobility and co-operation:** Cross-sectoral and international mobility encourages innovation and best practices.

- How to improve opportunities for professional development through cross-sectoral partnerships and mobility at the national and international levels?
- How to leverage the global nuclear community to address collective issues that may manifest very differently in diverse national-level ecosystems?

**Communicating safety, sustainability, and career vibrancy:** Public relations directly influences perceptions of nuclear as an attractive and socially responsible career field.

- How can the industry and governments proactively develop and share their own narratives, including the nuclear industry's high safety standards and role in reducing the carbon footprint?
- How can the nuclear community improve public awareness with science-based communications and outreach?

**Aligning changing professional and personal aspirations with organisational needs:** Flexibility, diverse projects, feedback and career progression fuel job satisfaction, which can be of greater consideration than other benefits in determining personnel retention.

- How to better understand what the new generation of professionals want, and how that aligns with organisational goals?

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While the nuclear Human Capital is steadily declining, we are not at the cliff edge yet. However, as we look towards the future, a strong commitment to invest and innovate is required to avoid it.

Greg Rzentkowski  
Director of the Division of Nuclear  
Installation Safety, IAEA

## What should the nuclear community do?

**Take a collective – but not generic – whole-community approach:** While different nuclear communities and stakeholders have unique needs, human capital is a shared resource. The nuclear sector depends upon a resilient talent pipeline. Individual bottom-up approaches could be combined and co-ordinated through top-down policy. The nuclear community could consider a global approach to recruiting and investing in human capital, including cross-sectoral strategic planning, communications and co-operation at the international and national levels.

**Communicate early and often with the next generation:** The nuclear community could develop joint narratives, co-ordinated messaging and outreach campaigns to share science-based, plain-language communication about nuclear science and technology. The nuclear community and educational institutions could inform the younger generation about opportunities in the nuclear industry for diverse, rewarding, long-term careers, including the alignment and transferability of knowledge and skills to and from a range of educational and career backgrounds.

**Enable greater mobility by establishing internationally recognised nuclear qualifications:** Identify core knowledge and skills necessary for particular technical roles and develop international policy instruments or standards for evaluation and global recognition of nuclear qualifications.

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Regardless of the local culture in which one operates, successful organisational culture shares universal values: continuous improvement, leadership, and people who are challenging the status quo and trying to improve things. Our industry needs this innovative drive.

We need it in order to leverage new technologies, to ensure that this industry has a future and that nuclear is part of the solution for managing climate change.

Peter Prozesky  
Chief Executive Officer, WANO