



Model
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BYU Kennedy Center

36th Annual

BRIGHAM YOUNG UNIVERSITY MODEL UNITED NATIONS CONFERENCE

Sponsored by the David M. Kennedy Center for International Studies

Friday, October 31, 2025 – Provo, Utah

Most esteemed Delegates,

Welcome to the 36th annual Brigham Young University Model United Nations Conference. My name is Mauricio Morales, and I have the honor to be your International Atomic Energy Agency (IAEA) committee director. I'm a first-generation and international student from Bolivia at BYU pursuing a degree in Latin American Studies with emphasis in Lusophone Countries, Literature, Culture, and History. I had the opportunity to participate in the Model United Nations (MUN) program since middle school and in recent years I was part of BYUMUN's team representing Ecuador, France, Kuwait, Nepal, and Portugal. I have also served as the Assistant Director and Director for the Organization of American States (OAS) at BYUMUN, and as the Head Delegate for our award winning BYUMUN 2025 team. Participating in MUN led me to many other opportunities and experiences that are shaping my future career in diplomacy. I'm looking forward to directing the BYUMUN IAEA to create lasting and innovative solutions with the aim to achieve the Agenda 2030.

This year, the International Atomic Energy Agency will focus on the following topics:

- I. Ensuring IAEA Access and Safety in Iran Post-Military Strikes
- II. Safeguarding the Nuclear Future: Addressing Workforce and Knowledge Gaps

In today's complex global environment, the international community faces constant challenges from potential threats that undermine trust, stability, and cooperation. Around the world, key actors often contribute to an atmosphere of fear and mistrust. Yet, the IAEA has consistently played a vital role in countering these dynamics; fostering transparency, promoting self-reporting, and enabling Member States to hold themselves and one another accountable. Despite these important achievements, more work remains to be done. Greater understanding of the IAEA's mission and responsibilities is essential, as is the active participation of all Member States in upholding their obligations. The past months have underscored the urgency of our work, with new issues emerging that demand not only vigilance but also innovation in our approaches.

This background guide provides only basic knowledge on the topics and is meant to serve as a springboard for further research. Please consider the role that your assigned Member State plays in the international sphere and their views and policies regarding the topic. As delegates, your task will be to engage in thoughtful debate, develop innovative solutions, and work towards building consensus that places the well-being of people and the preservation of peace above narrow state interests. I encourage you to approach these discussions with open minds, respect for diverse perspectives, and a commitment to collaborative problem-solving that reflects the highest ideals of international cooperation.

If any questions arise regarding the BYUMUN Conference or the IAEA, please do not hesitate to reach out. I am eager to work with each of you and wish you all the best in your preparation for this exciting journey.

With highest consideration,
Mauricio G. Morales
Director: International Atomic Energy Agency

SECRETARIAT

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Security Council

Kelly Miles
*United Nations Children's
Fund*

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INTERNATIONAL
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Cory Leonard
Assistant Director

Committee History

“The proposal of Atoms for Peace is more relevant than ever and the IAEA is the vehicle by which we are making it a reality. Every day on every continent, the IAEA supports nations ... by seizing opportunities to improve healthcare, agriculture, and energy systems through the power of nuclear science and technology.”— Rafael Mariano Grossi

The International Atomic Energy Agency (IAEA) was founded in 1957 as an outcome of U.S. President Dwight D. Eisenhower’s 1953 “Atoms for Peace” speech, which urged the peaceful use of nuclear technology while preventing its military application. Its Statute, approved in 1956, created a unique dual mandate: to promote the peaceful benefits of atomic energy while safeguarding against its misuse for military purposes. Headquartered in Vienna, the IAEA has regional and liaison offices worldwide to coordinate its work.¹

IAEA Mandate

The IAEA’s mandate, enshrined in Article II of its Statute, is “to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world” and to ensure that any assistance provided “is not used in such a way as to further any military purpose.”² The agency fulfills this mandate by conducting inspections, applying safeguards under agreements with Member States, approving nuclear facilities and equipment according to safety and non-military criteria, requiring operational records, and exercising oversight over nuclear materials.³ In cases of non-compliance, it can suspend assistance, but it cannot impose direct penalties without UN Security Council involvement.

IAEA Achievements

The IAEA has achieved notable successes in advancing global nuclear safety and non-proliferation. It was jointly awarded the Nobel Peace Prize in 2005 with Director-General Mohamed ElBaradei for its efforts in preventing nuclear weapons proliferation and promoting peaceful nuclear technology.⁴ Through its safeguards and verification work, it has investigated undeclared nuclear activities in countries such as North Korea and Iraq, upholding international

¹ International Atomic Energy Agency, History.

² IAEA Statute, Article II.

³ IAEA Statute, Articles III & XII.

⁴ Nobel Prize, The Nobel Peace Prize 2005.

trust in its impartiality.⁵ The agency has also led coordinated responses to nuclear disasters, including the Chernobyl accident in 1986 and the Fukushima Daiichi disaster in 2011, producing action plans and strengthening safety standards worldwide.⁶ Beyond security, the IAEA has contributed to development through projects like Atoms4Food, ZODIAC (Zoonotic Disease Integrated Action), NUTEC Plastics, and technical cooperation programs that support agriculture, healthcare, and environmental sustainability in over 140 countries.⁷ It also serves as the depositary for important nuclear safety conventions, including the Convention on Early Notification of a Nuclear Accident (1986) and the Convention on Nuclear Safety (1994).⁸

Today, the IAEA's role remains highly relevant. Director-General Rafael Grossi has engaged in high-stakes diplomacy, including facilitating inspections at the conflict-affected Zaporizhzhia Nuclear Power Plant in Ukraine and overseeing monitoring efforts related to Iran's nuclear program.⁹ The agency has also promoted transparency in issues like the planned discharge of treated water from Fukushima.¹⁰ In Iran, the IAEA's verification work under the Nuclear Non-Proliferation Treaty (NPT) continues despite challenges such as reduced inspection access following the U.S. withdrawal from the 2015 Joint Comprehensive Plan of Action (JCPOA) and Iran's retraction of the Additional Protocol.¹¹

Conclusion

While the IAEA has important capabilities, it operates within significant constraints. It can carry out inspections and verify compliance under safeguards agreements and Additional Protocols, issue voluntary safety standards, conduct expert peer reviews, and coordinate global responses to accidents.^{12 13 14} However, it lacks enforcement powers and depends on the voluntary cooperation of states.¹⁵ It cannot compel a state to open non-declared sites without explicit legal authority, and it has no jurisdiction over nuclear weapons programs without UN Security Council

⁵ International Atomic Energy Agency, Safeguards Overview.

⁶ IAEA, Chernobyl" and "Fukushima Daiichi Accident.

⁷ IAEA, Technical Cooperation Programme, Atoms4Food, ZODIAC, NUTEC Plastics.

⁸ Convention on Early Notification of a Nuclear Accident; Convention on Nuclear Safety.

⁹ IAEA, Director General's Updates.

¹⁰ IAEA, Fukushima Water Release.

¹¹ IAEA, Verification and Monitoring in Iran.

¹² United Nations Security Council resolutions on nuclear programs.

¹³ IAEA, Additional Protocol.

¹⁴ IAEA, Safety Standards.

¹⁵ IAEA, Peer Review Services.

authorization.^{16 17} The agency's role in nuclear security is similarly limited to cases where it is invited to assist.

The IAEA's blend of technical oversight, diplomatic engagement, and developmental assistance has positioned it as a central player in the global nuclear order. For the purposes of our conference, delegates should recognize both the agency's successes and its limits. While the IAEA has been instrumental in promoting nuclear safety and verifying non-proliferation commitments, its effectiveness ultimately relies on the willingness of states to cooperate and on the support of the broader international system.

¹⁶ IAEA, Limitations and Challenges.

¹⁷ IAEA, Nuclear Security Overview.

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International Atomic Energy Agency. *Atoms for Peace Speech*. Accessed July 15, 2025. <https://www.britannica.com/event/Atoms-for-Peace-speech>.

In this article, you will find an essential overview of President Eisenhower's "Atoms for Peace" address to the United Nations in December 1953. It highlights his vision of transforming nuclear technology from a tool of destruction to one for human progress, "not dedicated to death, but consecrated to life." The speech laid the ideological and diplomatic foundation for the creation of the International Atomic Energy Agency.

Fischer, David. *History of the International Atomic Energy Agency: The First Forty Years*. Vienna: International Atomic Energy Agency, 1997. https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1032_web.pdf.

This publication by David Fischer offers a detailed history of the IAEA's first forty years, from its roots in the "Atoms for Peace" initiative to its growth in safeguards and technical cooperation. It provides key context on the Agency's early challenges, institutional development, and evolving global role.

Grossi, Rafael Mariano. "Director General's Statement to the 78th Regular Session of the United Nations General Assembly." *International Atomic Energy Agency*, November 8, 2023. <https://www.iaea.org/newscenter/statements/director-generals-statement-to-the-78th-regular-session-of-the-united-nations-general-assembly>.

"The Nobel Peace Prize 2005." *IAEA Bulletin* 47, no. 2 (March 2006). <https://www.iaea.org/sites/default/files/publications/magazines/bulletin/bull47-2/47210302829.pdf>.

This article from the IAEA Bulletin provides an overview of the agency's receipt of the 2005 Nobel Peace Prize, emphasizing its crucial role in promoting the peaceful use of nuclear energy while preventing nuclear proliferation. It discusses how the award recognized the IAEA's efforts to enhance global security through verification, safeguards, and technical cooperation. The piece also reflects on the lasting impact and responsibilities that the prize bestowed upon the agency in advancing international peace and nuclear safety.

International Atomic Energy Agency. *History*. International Atomic Energy Agency. Accessed August 9, 2025. <https://www.iaea.org/about/overview/history>.

In this article, you will find important information about the origins and development of the IAEA, from its creation in 1957 inspired by the “Atoms for Peace” initiative, to its ongoing mission of promoting peaceful nuclear technology while ensuring global safety and non-proliferation.

“International Atomic Energy Agency – Facts.” *NobelPrize.org*. Nobel Prize Outreach. Accessed August 9, 2025. <https://www.nobelprize.org/prizes/peace/2005/iaea/facts/>.

This webpage from NobelPrize.org highlights key facts about the IAEA’s verification successes, including its monitoring efforts in countries like North Korea and Iraq. It outlines the agency’s role in preventing nuclear proliferation and ensuring compliance with international agreements. The page underscores the IAEA’s importance as a trusted global authority in nuclear safeguards and security.

International Atomic Energy Agency. *International Atomic Energy Agency*. Accessed August 1, 2025. <https://www.iaea.org>.

This official webpage provides a comprehensive overview of the International Atomic Energy Agency (IAEA), detailing its mandate, organizational structure, and core missions. It serves as a primary source for understanding the agency’s role in promoting peaceful nuclear technology and ensuring nuclear safety and security worldwide. The site offers up-to-date information on the IAEA’s activities and strategic objectives.

“Nobel Peace Prize Awarded to IAEA and Director General.” *IAEA News*. International Atomic Energy Agency, October 7, 2005. <https://www.iaea.org/newscenter/news/nobel-peace-prize-awarded-iaea-and-director-general>.

This IAEA news release announces that the International Atomic Energy Agency and its Director General, Mohamed ElBaradei, were awarded the 2005 Nobel Peace Prize. The prize recognized their significant contributions to nuclear non-proliferation, promoting peaceful uses of nuclear energy, and enhancing global security through diplomacy and verification efforts.

“The Nobel Peace Prize 2005.” *NobelPrize.org*. Nobel Prize Outreach. Accessed July 9, 2025. <https://www.nobelprize.org/prizes/peace/2005/summary/>.

This article announces the 2005 Nobel Peace Prize awarded to the IAEA and Director General Mohamed ElBaradei for their work preventing nuclear weapons use and promoting safe, peaceful nuclear energy. It highlights the IAEA’s crucial role in global nuclear security and cooperation.

I. Ensuring IAEA Access and Safety in Iran Post-Military Strikes

“In this moment of global uncertainty, anxiety, fear and distress, we must come together and recommit to the noble principles enshrined in the NPT: nuclear non-proliferation, disarmament, and to promote cooperation in peaceful uses of nuclear energy. ... The IAEA will be with them every step of the way.”— Rafael Mariano Grossi

Introduction

In June 2025, coordinated military strikes targeted multiple Iranian nuclear facilities—including the Fordow, Natanz, and Isfahan enrichment complexes. These attacks severely disrupted essential infrastructure; several centrifuge cascades were destroyed or damaged, and auxiliary systems such as ventilation and coolant systems were compromised.¹⁸ Iran publicly stated that the damage was limited and largely symbolic, yet independent technical analyses estimated that up to 400 kilograms of uranium enriched to approximately 60% U-235 may have been relocated or rendered inaccessible.¹⁹ Such high-enriched uranium raises concern for potential weapons capability if verification is lost.

Prior to these events, Iran maintained a relatively transparent relationship with the IAEA, which had documented operation of various centrifuge types—IR-1, IR-2m, IR-4, and IR-6—across enrichment sites.²⁰ The IAEA’s 2024 Safeguards Implementation Report confirmed that Iran was one of 190 States under safeguards, indicating the Agency’s global reach and experience in verifying nuclear material.²¹ However, Iran’s partial suspension of the Additional Protocol in 2021 had already limited expanded access and environmental sampling.²² The June strikes, therefore, worsened an already constrained verification environment.

Safety concerns prompted immediate action: the IAEA evacuated most of its inspectors from Iran for safety reasons, leaving just a handful on the ground by early July.²³ Damage to surveillance equipment, including remote monitoring cameras, further undermined verification continuity.²⁴ Without timely site access, the IAEA lost not just verification coverage but the capability to assay uranium stockpiles, confirm whether nuclear material had been diverted, or

¹⁸ International Atomic Energy Agency, “Report on Recent Military Strikes on Iranian Nuclear Facilities,” IAEA, June 2025,

¹⁹ Nuclear Threat Initiative, “Iran Nuclear Facility Damage Assessment,” NTI, July 2025

²⁰ International Atomic Energy Agency, “Safeguards Implementation Report 2024,” IAEA, 2024,

²¹ Ibid.

²² United Nations Security Council, “Resolution on Iran Additional Protocol Suspension,” UNSC Resolution 2021/112, December 2021.

²³ IAEA, “Update on Inspection Operations in Iran,” July 2025,

²⁴ Ibid.

assess equipment integrity. Compounding this is the potential for environmental or radiological hazards. Although the strikes didn't result in containment breaches, damage to cooling systems, shielding, and waste storage raised the possibility of hazardous releases.²⁵ The IAEA's charter includes nuclear safety oversight and emergency response capabilities; however, these can only be exercised through direct access, sampling, and technical evaluation.²⁶ Delays in access could imperil public health—both within Iran and regionally—through contaminated air, water, or soil.²⁷

Politically, Iran's legislature responded by passing a bill suspending cooperation with the IAEA until Tehran received satisfactory assurances of safety.²⁸ This move reflects Iran's assertions of sovereignty and concerns over perceived politicization of inspections, but it also disrupts the legally binding framework of safeguards, including the Nuclear Non-Proliferation Treaty (NPT) obligations. Internationally, state actors urged the UN Security Council to convene emergency meetings, warning of the destabilizing impact of unchecked nuclear activity and degraded inspections on regional security.²⁹

Verification, Safety, and Diplomacy

The disruption of IAEA verification efforts in Iran following the military strikes poses significant risks to global non-proliferation efforts. The removal of inspectors and damage to remote monitoring equipment have created a critical verification gap. Without timely access to nuclear sites and continuous surveillance, the IAEA cannot confidently confirm that Iran's nuclear material remains undeclared or un-diverted for non-peaceful purposes. This verification vacuum risks allowing nuclear activities to proceed unchecked, increasing the likelihood of proliferation and undermining decades of international safeguards agreements.

In addition to verification concerns, the strikes have introduced pressing nuclear safety risks. Damage to enrichment facilities and associated infrastructure, such as cooling systems and waste storage, raises the possibility of environmental contamination and radiological hazards. The IAEA has a mandate not only to verify nuclear material but also to oversee nuclear safety and emergency preparedness. However, these responsibilities can only be fulfilled if inspectors have safe and unhindered access to sites. Any delay or denial of access jeopardizes not only the

²⁵ International Atomic Energy Agency, "Nuclear Safety Risks Post-Facility Attacks," IAEA, August 2025.

²⁶ IAEA Statute, Article III, Mandate on Safety and Emergency Preparedness.

²⁷ World Health Organization, "Health Risks of Nuclear Facility Damage," WHO Report, 2025.

²⁸ Iranian Parliament, "Bill on Suspension of Cooperation with the IAEA," July 2025.

²⁹ United Nations Security Council, Emergency Meeting Record, July 2025.

integrity of the nuclear non-proliferation regime but also the health and safety of local populations, with potential consequences for neighboring regions.

Diplomatically, the situation has heightened tensions between Iran and the international community. Iran's suspension of cooperation with the IAEA reflects deep mistrust and concerns over sovereignty and political motivations behind inspections. Meanwhile, global actors worry that reduced transparency could lead to escalation and instability in a volatile region. The role of the IAEA as an impartial technical agency is thus put under strain, as it must navigate political pressures while maintaining its critical verification and safety functions. Restoring cooperation and safe access will require careful diplomacy, balancing respect for Iran's sovereignty with the international community's interest in preventing nuclear proliferation and ensuring safety.

Comparative Case Studies

Historical precedents demonstrate the critical importance of timely and unhindered access for the IAEA in nuclear verification and safety oversight. In Iraq, following the Gulf War in 1991, the IAEA and the United Nations Monitoring, Verification and Inspection Commission (UNMOVIC) faced significant challenges verifying the dismantlement of Saddam Hussein's nuclear weapons program. The Iraqi government initially obstructed inspections, and many facilities were damaged or hidden, necessitating a strong UN Security Council mandate to restore full access. The eventual comprehensive inspections allowed the IAEA to verify dismantlement but only after protracted political negotiations and enforcement actions. This case underscores that political will and international backing are essential to overcoming sovereignty disputes and ensuring inspection access.

Similarly, the situation in Syria following the 2007 Israeli airstrike on the al-Kibar nuclear reactor illustrates the difficulties when verification is delayed or denied. The IAEA was unable to inspect the site until 2018, more than a decade later, delaying environmental sampling critical for confirming the nature and extent of the nuclear activities.³⁰ The protracted delay severely limited the IAEA's ability to provide timely assessments and contributed to ongoing regional instability. Both Iraq and Syria cases highlight that damage to nuclear sites, combined with restricted access, undermines the effectiveness of safeguards and may encourage further proliferation risks.

³⁰ United Nations Monitoring, Verification and Inspection Commission (UNMOVIC), "Iraq Nuclear Inspection Challenges," UNMOVIC Report, 1999.

Connection to Sustainable Development Goals (SDGs)

The issue of ensuring IAEA access and safety in Iran is closely linked to several United Nations Sustainable Development Goals (SDGs). Most notably, SDG 16, which promotes peace, justice, and strong institutions, is directly implicated. The IAEA functions as a global institution that fosters transparency and accountability in nuclear activities, thereby reducing conflict risks and supporting peaceful coexistence.³¹ Maintaining IAEA access upholds this goal by ensuring that nuclear programs remain peaceful and that verification processes are credible and impartial.

Furthermore, SDG 3—good health and well-being—is relevant given the potential radiological risks posed by damaged nuclear infrastructure. Unchecked nuclear facilities can release harmful radioactive materials, posing serious health hazards to local populations and the environment.³² The IAEA’s mandate to oversee nuclear safety and emergency response aligns with this goal by aiming to prevent such adverse health outcomes.

Additionally, SDG 7, which emphasizes affordable and clean energy, intersects with Iran’s use of nuclear technology for peaceful purposes, including power generation.³³ Safe and secure operation of nuclear facilities contributes to sustainable energy goals, particularly in a world seeking to reduce reliance on fossil fuels. Ensuring IAEA oversight supports the balance between peaceful nuclear energy development and non-proliferation objectives, making the restoration of access not only a security imperative but also a developmental one.

Current Challenges and Opportunities

The current situation presents several interconnected challenges that the IAEA and the international community must navigate. A primary challenge is the trust deficit between Iran and the IAEA, fueled by concerns over safety and sovereignty following the military strikes. Iran demands guarantees that inspections will not jeopardize its national security or political autonomy, while the IAEA requires unfettered access to fulfill its verification mandate effectively.³⁴ The damaged surveillance infrastructure compounds this challenge, as remote monitoring cameras and environmental sampling systems are offline or impaired, reducing the Agency’s situational awareness.

³¹ United Nations Development Programme, “SDG 16: Peace, Justice, and Strong Institutions,” UNDP, 2023.

³² World Health Organization, “SDG 3 and Nuclear Safety,” WHO, 2024.

³³ International Energy Agency, “SDG 7 and Nuclear Energy,” IEA Report, 2023.

³⁴ IAEA, “Statement on Cooperation Challenges with Iran,” August 2025.

Balancing respect for Iranian sovereignty with international non-proliferation commitments remains delicate. Tehran's legislative move to suspend cooperation with the IAEA reflects domestic political pressures and skepticism of Western motives, complicating diplomatic engagement.³⁵ Meanwhile, the international community risks escalation if verification gaps persist, as uncertainty about Iran's nuclear activities fuels mistrust and potential countermeasures.

Nevertheless, there are opportunities to build confidence and restore cooperation. Offering joint safety assessments involving Iranian experts and IAEA inspectors could address mutual concerns and foster transparency. Reestablishing damaged remote monitoring equipment and allowing environmental sampling under agreed protocols would improve verification while respecting safety. Moreover, framing discussions around shared humanitarian goals—such as protecting public health and the environment—could depoliticize aspects of the dispute and encourage collaboration.³⁶ Engaging regional partners and leveraging multilateral forums to support dialogue may also facilitate a peaceful resolution, aligning with the broader aims of the United Nations.

Conclusion

The challenges before this committee call for a spirit of unwavering collaboration and thoughtful innovation, grounded firmly in the principles and mandate of the IAEA. Delegates must rise to the occasion by forging solutions that uphold the integrity of nuclear verification, promote safety, and respect the sovereignty of all states involved. It is through such collective commitment and diplomatic resolve that we can reinforce the global non-proliferation architecture and contribute meaningfully to international peace and security. Let this committee be a forum where diverse perspectives converge, where novel approaches to verification and safety are embraced, and where the shared goal of a safer, more transparent nuclear future guides every decision. Together, we have the responsibility and the opportunity to ensure that the IAEA continues to serve as an impartial guardian of peace and stability in an increasingly complex world.

³⁵ Reuters, "Iran Suspends IAEA Cooperation Amid Safety Concerns," Reuters, July 2025.

³⁶ United Nations Office for Disarmament Affairs, "Dialogue on Nuclear Safety and Cooperation," UNODA, 2025.

Questions to Consider

1. In light of the June 2025 strikes on Iranian nuclear facilities, how should the IAEA balance its verification responsibilities with ensuring the safety of inspectors in potentially hazardous environments?
2. What diplomatic strategies could help rebuild trust between Iran and the IAEA after a suspension of cooperation, while still upholding the legally binding safeguards of the NPT?
3. Given that damaged nuclear facilities can pose environmental and health risks, what role should international safety norms and emergency response mechanisms play in restoring oversight?
4. How do past cases—such as Iraq after 1991 or Syria after 2007—illustrate the consequences of delayed or denied IAEA access, and what lessons can be applied to the current situation with Iran?
5. How can IAEA oversight in Iran be framed not only as a security issue but also as a contribution to Sustainable Development Goals such as peace (SDG 16), health (SDG 3), and clean energy (SDG 7)?
6. Should states under IAEA safeguards have the right to restrict inspector access after external military actions, or does this undermine the global non-proliferation regime? How can sovereignty and verification be reconciled?

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SDG 3 and Nuclear Safety. Geneva: World Health Organization, 2024.
<https://www.who.int/initiatives/sdg3-global-action-plan/progress-and-impact/progress-reports/2024>

II. Safeguarding the Nuclear Future: Addressing Workforce and Knowledge Gaps

“As new technologies create new opportunities and as nuclear science and technology support the Sustainable Development Goals, the IAEA is ensuring that no one is left behind... Safety and security norms and international legal frameworks will continue to remain strong, flexible, and forward-looking.”

— Rafael Mariano Grossi

Introduction

The global nuclear sector stands at a critical crossroads. With growing interest in nuclear power as a low-carbon energy source to meet climate goals, ensuring a skilled, knowledgeable, and sustainable workforce has become a paramount concern. Many countries face a looming “retirement cliff,” where experienced nuclear experts are retiring faster than new talent can be recruited and trained. This demographic shift threatens to create significant workforce shortages and risks the loss of critical institutional knowledge, which is vital for the safe, secure, and efficient operation of nuclear facilities worldwide.³⁷ The International Atomic Energy Agency (IAEA) has emphasized that addressing workforce and knowledge gaps is essential not only for nuclear safety and non-proliferation but also for achieving Sustainable Development Goals (SDGs) related to energy, education, and innovation.³⁸

Workforce Demographics and Knowledge Attrition

Aging is a pressing issue in the nuclear sector. Data from the World Nuclear Association (WNA) estimates that nearly 50% of the nuclear workforce in many countries is over the age of 50, with retirements accelerating in the next decade.³⁹ This trend endangers the retention of “tacit knowledge”—the experiential understanding of complex nuclear systems that cannot be fully captured in manuals or databases.⁴⁰ A study by the IAEA highlights that such knowledge transfer is difficult because it requires mentorship, on-the-job experience, and direct communication between generations of experts.⁴¹ Yet, many nuclear facilities struggle to implement systematic

³⁷ World Nuclear Association, “The Aging Workforce in Nuclear Power,” accessed August 9, 2025

³⁸ International Atomic Energy Agency, “Nuclear Knowledge Management,” accessed August 9, 2025

³⁹ World Nuclear Association, “Workforce Challenges,” accessed August 9, 2025

⁴⁰ AEA, *The Nuclear Power Industry's Ageing Workforce: Transfer of Knowledge to the Next Generation*, IAEA-TECDOC-1399 (Vienna: IAEA, 2004)

⁴¹ Ibid.

knowledge management programs, leading to gaps in expertise, reduced operational efficiency, and increased safety risks.⁴²

In addition to demographic challenges, the pace of technological innovation in nuclear science complicates workforce development. New reactor designs, digital instrumentation, and cybersecurity concerns require updated skill sets.⁴³ However, existing educational and training institutions often lag in adapting curricula to these emerging needs, resulting in a mismatch between workforce capabilities and technological demands.⁴⁴ Without timely investment in training, the sector risks creating gaps that compromise operational safety and the global non-proliferation regime.⁴⁵

IAEA and International Efforts to Address Gaps

Recognizing these challenges, the IAEA has spearheaded numerous initiatives aimed at supporting member states in workforce development and knowledge management. The IAEA's Nuclear Knowledge Management (NKM) framework promotes capturing, preserving, and sharing nuclear expertise.⁴⁶ Through this program, the Agency supports countries in establishing knowledge repositories, mentorship programs, and digital platforms to facilitate experience transfer.⁴⁷

One flagship initiative is the IAEA's Nuclear Knowledge Management Schools, which since 2004 have trained over 700 nuclear professionals worldwide in best practices for managing knowledge assets and fostering intergenerational collaboration.⁴⁸ These schools focus on unique nuclear industry challenges, such as managing operational experience and succession planning.⁴⁹

Complementing education, the IAEA offers Knowledge Management Assist Visits (KMAVs) that provide peer reviews and tailored recommendations to organizations struggling with workforce sustainability.⁵⁰ These visits help identify vulnerabilities and develop strategies to

⁴² OECD Nuclear Energy Agency, *Managing Knowledge to Deliver Nuclear Safety*, NEA No. 7543 (2021)

⁴³ IAEA, "Emerging Nuclear Technologies and Skills Gaps," *Bulletin*, vol. 61, no. 3 (2020),

⁴⁴ OECD, "Nuclear Education and Training," NEA Report No. 7081 (2019),

⁴⁵ IAEA, "Human Resource Development for Sustainable Nuclear Energy," IAEA Nuclear Energy Series No. NG-G-2.1 (2016),

⁴⁶ IAEA, "Nuclear Knowledge Management," accessed August 9, 2025,

⁴⁷ IAEA, "School of Nuclear Knowledge Management," accessed August 9, 2025,

⁴⁸ *Ibid.*

⁴⁹ *Ibid.*

⁵⁰ IAEA, "Knowledge Management Assist Visits (KMAV)," accessed August 9, 2025,

mitigate knowledge loss, such as enhanced documentation, training programs, and staff rotation schemes.⁵¹

The IAEA also partners with other international organizations. For example, in 2025, the World Bank and IAEA announced collaboration to promote nuclear power development in emerging economies while ensuring workforce readiness and safety.⁵² This cooperation supports the deployment of small modular reactors (SMRs), considered promising for providing affordable, clean energy in developing countries, but which require specialized training and operational expertise.⁵³

Risks and Challenges

Despite these efforts, significant hurdles remain. First, the retention of tacit knowledge is inherently challenging. Experts nearing retirement may retire abruptly due to policy changes or personal reasons, leaving sudden expertise gaps.⁵⁴ Furthermore, not all knowledge is easily formalized, increasing reliance on oral histories and informal networks which can be fragile.⁵⁵

Second, resource constraints in many countries limit investments in workforce development. Budgetary pressures, competing priorities, and political instability can disrupt training programs, recruitment, and knowledge transfer activities.⁵⁶ Without sustained funding and policy support, knowledge gaps will worsen.

Third, cultural and institutional differences among countries and organizations complicate the adoption of uniform knowledge management practices.⁵⁷ Language barriers, varying regulatory frameworks, and organizational resistance to change often slow progress in workforce modernization.⁵⁸

⁵¹ Ibid.

⁵² Reuters, “World Bank, IAEA to cooperate on nuclear power development, safety,” June 26, 2025,

⁵³ IAEA, “Small Modular Reactors: Status and Challenges,” IAEA TECDOC Series No. 1870 (2024)

⁵⁴ OECD NEA, *Succession Planning in the Nuclear Industry*, NEA No. 7568 (2022),

⁵⁵ Ibid.

⁵⁶ World Nuclear Association, “Challenges in Nuclear Workforce Development,” accessed August 9, 2025,

⁵⁷ IAEA, “Cultural Factors in Nuclear Knowledge Management,” Bulletin vol. 62, no. 4 (2021),

⁵⁸ Ibid.

Finally, rapid technological change creates a moving target for education and training institutions. Keeping curricula current with innovations like advanced reactor designs, digital twins, and AI integration is difficult, yet essential to prevent skill obsolescence.⁵⁹

Connection to Sustainable Development Goals (SDGs)

Addressing workforce and knowledge gaps in the nuclear sector directly supports several Sustainable Development Goals by fostering the human and institutional capacities necessary for sustainable energy, technological innovation, and peaceful uses of nuclear technology. SDG 4 (Quality Education) emphasizes inclusive, equitable, and lifelong learning opportunities; nuclear workforce development initiatives embody this by establishing specialized training programs, academic partnerships, and technical apprenticeships that ensure future professionals can operate, regulate, and innovate within the sector.⁶⁰ These programs are vital in countries expanding nuclear energy production, where the rapid introduction of new technologies must be matched by equally rapid skill acquisition to maintain safety and performance standards.

The nuclear industry's contributions to SDG 7 (Affordable and Clean Energy) are similarly dependent on workforce capacity. Nuclear power currently provides approximately 10% of the world's electricity and nearly one-third of low-carbon electricity globally,⁶¹ yet this contribution cannot be sustained without qualified operators, engineers, regulators, and researchers. The preservation of institutional knowledge and the recruitment of new talent ensure that nuclear power remains a reliable clean energy source in the decarbonization mix, supporting net-zero commitments under the Paris Agreement.

SDG 9 (Industry, Innovation, and Infrastructure) is advanced when a robust nuclear workforce drives technological progress. From small modular reactors (SMRs) to advanced fuel cycles, these innovations require personnel with highly specialized competencies to move from design to deployment.⁶² Strengthening educational pipelines and research collaborations not only safeguards existing infrastructure but also accelerates the development of resilient, future-ready systems.

Finally, the intersection with SDG 16 (Peace, Justice, and Strong Institutions) lies in the human capacity to uphold nuclear safety, security, and non-proliferation commitments. Competent professionals are essential for maintaining regulatory oversight, enforcing international safeguards, and fostering transparency between states.⁶³ In this way, addressing workforce and

⁵⁹ OECD, "Skills and Competencies for Nuclear Innovation," NEA Report No. 7650 (2023),

⁶⁰ United Nations, "Sustainable Development Goal 4: Quality Education,"

⁶¹ United Nations, "Sustainable Development Goal 7: Affordable and Clean Energy,"

⁶² United Nations, "Sustainable Development Goal 9: Industry, Innovation, and Infrastructure,"

⁶³ United Nations, "Sustainable Development Goal 16: Peace, Justice, and Strong Institutions,"

knowledge gaps becomes not merely a sectoral challenge but a broader governance and peacebuilding imperative, directly reinforcing the UN’s vision of strong, accountable institutions.

Opportunities and Advances

The challenge of sustaining a nuclear workforce also presents unique opportunities to modernize education, expand inclusivity, and leverage technology for long-term resilience. Digital innovations such as immersive virtual reality simulators, AI-driven knowledge repositories, and interactive online learning platforms allow for more efficient knowledge transfer and hands-on training without the need for constant access to operational facilities.⁶⁴ These tools can capture the tacit knowledge of retiring experts in a form that is scalable and accessible, mitigating the risks associated with sudden retirements. Additionally, remote learning modalities have broadened participation, enabling students and professionals in regions without nuclear infrastructure to engage in global training programs,⁶⁵ thereby expanding the potential talent pool.

International collaboration amplifies these advances. Cross-border partnerships—whether through IAEA-coordinated programs, bilateral training agreements, or multilateral research consortia—allow countries to share best practices, harmonize technical standards, and coordinate capacity-building efforts.⁶⁶ This is particularly valuable for emerging nuclear states, which can benefit from the experience of established nuclear nations while contributing local expertise and innovation to the global community.

Another significant opportunity lies in workforce diversification. Currently, women represent less than 25% of the global nuclear workforce,⁶⁷ and targeted recruitment efforts could help redress this imbalance, bringing varied perspectives to problem-solving and innovation. Beyond gender, encouraging participation from underrepresented regions and socio-economic groups can foster more equitable access to the benefits of nuclear technology while increasing the resilience of the sector against skills shortages.

By harnessing these advances—technological, collaborative, and demographic—states can not only fill current knowledge gaps but also build an adaptive, forward-looking workforce prepared to manage the next generation of nuclear technologies. This approach aligns with the IAEA’s

⁶⁴ IAEA, “Digital Technologies for Nuclear Knowledge Preservation,” Technical Report (2023),

⁶⁵ OECD NEA, *Distance Learning in Nuclear Education*, NEA No. 7623 (2022),

⁶⁶ IAEA, “International Cooperation in Nuclear Human Resource Development,” Bulletin vol. 63, no. 1 (2022),

⁶⁷ Ibid.

long-term vision for a safe, secure, and sustainable nuclear future, where human capital is as integral as technological innovation in achieving global energy and development objectives.⁶⁸

Conclusion

Safeguarding the nuclear future requires urgent, coordinated action to address workforce and knowledge gaps. By investing in human resource development, knowledge management, and international cooperation, member states can ensure a competent nuclear workforce capable of safely harnessing nuclear technology for peaceful purposes. Delegates are encouraged to consider innovative approaches that leverage digital tools, promote inclusive education, and strengthen global partnerships, in line with the IAEA's mandate and the Sustainable Development Goals. The security, sustainability, and prosperity of the nuclear sector depend on the people who operate and regulate it today and tomorrow.⁶⁹

Questions to Consider

1. How can the international community ensure that critical tacit knowledge, held by retiring nuclear experts, is preserved and effectively passed on to the next generation of workers?
2. What role should the IAEA and other global institutions play in harmonizing nuclear education and training across countries with vastly different levels of nuclear infrastructure?
3. Given the rapid pace of technological change in nuclear science, how can educational programs stay relevant and prevent skills from becoming obsolete?
4. In what ways can workforce diversification, such as increasing participation by women and underrepresented regions, strengthen the safety, security, and innovation capacity of the global nuclear sector?
5. How do workforce development and knowledge management contribute to achieving Sustainable Development Goals like SDG 4 (Quality Education), SDG 7 (Clean Energy), and SDG 9 (Industry, Innovation, Infrastructure)?
6. Should nuclear workforce and training initiatives focus primarily on national self-sufficiency or on international cooperation? How can countries balance sovereignty with the benefits of cross-border knowledge sharing?

68

World Nuclear Association, "Diversity and Inclusion in the Nuclear Sector," accessed August 9, 2025,

⁶⁹ IAEA, *Human Resource Development for a Net Zero Future*, Bulletin (2025),

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