### International Atomic Energy Agency (IAEA)

#### Introduction

The International Atomic Energy Agency (IAEA) is a specialized committee operating within the framework of the United Nations (UN), established to promote the peaceful use of nuclear energy while preventing its misuse for military purposes.<sup>1</sup> As a pivotal entity in global nuclear governance, the IAEA is tasked with ensuring the safe, secure, and peaceful application of nuclear technology worldwide.<sup>2</sup> The IAEA plays a crucial role in verifying compliance with nuclear non-proliferation agreements, safeguarding nuclear materials, and assisting Member States in developing nuclear energy capabilities for peaceful purposes. Through collaborative efforts with Member States, international organizations, scientific institutions, and other stakeholders, the IAEA works to address nuclear challenges, promote nuclear safety and security standards, and facilitate the sustainable development of nuclear energy technologies to benefit humanity while minimizing risks associated with their use.<sup>3</sup>

The IAEA collaborates closely with various UN committees and organizations to fulfill its mandate effectively. One key partner is the UN Security Council, where the IAEA provides valuable insights and technical expertise on nuclear proliferation threats and related security issues, such as through the Atoms for Peace agency.<sup>4</sup> Additionally, the IAEA works closely with the UN Office for Disarmament Affairs (UNODA) to promote disarmament initiatives and strengthen global non-proliferation efforts, especially in regard to existing treaties.<sup>5</sup>

The IAEA's mission is supported by three fundamental pillars, each representing crucial domains of its work. These pillars encompass Safety and Security, ensuring the responsible use of nuclear technology and guarding against potential hazards; Science and Technology, driving innovation and advancement in nuclear applications for peaceful purposes; and Safeguards and Verification, safeguarding against the proliferation of nuclear weapons through rigorous monitoring and verification mechanisms.<sup>6</sup>

### Governance, Mandate, Membership and Structure

The IAEA was established by A/RES/129 of the United Nations General Assembly in 1957 as an autonomous organization within the UN system in response to the growing need for international cooperation in the peaceful use of nuclear energy following the devastation of World War II and the advent of nuclear technology.<sup>7</sup> As a specialized agency of the UN, the IAEA was founded upon the principles outlined in its statute to promote the safe, secure, and peaceful applications of nuclear technology while preventing its misuse for military purposes.<sup>8</sup>

<sup>&</sup>lt;sup>1</sup> IAEA. The Statute of the IAEA.

<sup>&</sup>lt;sup>2</sup> IAEA. The IAEA Mission Statement. 2022.

<sup>&</sup>lt;sup>3</sup> Ibid.

<sup>&</sup>lt;sup>4</sup> IAEA. The "Atoms for Peace" Agency.

<sup>&</sup>lt;sup>5</sup> UNODA. The Role of the IAEA in Connection with existing Nuclear-Weapon-Free Zone Treaties. 2020.

<sup>&</sup>lt;sup>6</sup> IAEA. The IAEA Mission Statement. 2022.

<sup>&</sup>lt;sup>7</sup> IAEA. History.

<sup>&</sup>lt;sup>8</sup> Ibid.

The mandate of the IAEA is guided by the IAEA Statute, established in 1957, which serves as the foundational legal framework for the agency's mission of promoting peaceful nuclear energy use and preventing military diversion.<sup>9</sup> It outlines functions like facilitating information exchange, providing technical assistance, and establishing safeguards for non-proliferation. The IAEA is allowed to: provide technical assistance to member states; foster international cooperation in nuclear research and development; establish safeguards to verify compliance with non-proliferation agreements; inspect nuclear facilities to ensure safety and security.<sup>10</sup> The IAEA is not allowed to: impose sanctions on non-compliant states; interfere with internal affairs of sovereign nations; take any kind of action against states not following appropriate safeguard measures.<sup>11</sup>

The internal structure of the IAEA comprises the General Conference, which sets policies, and the Board of Governors, overseeing operations.<sup>12</sup> Departments and divisions manage specific areas like nuclear safety and technical cooperation, while the Secretariat, led by the Director-General, administers day-to-day affairs and liaises with Member States and other entities.<sup>13</sup> The IAEA is funded through the Operational Regular Budget as well as contributions by Member States.

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# **Topic: Implementing New Safeguard Measures for Nuclear Facilities**

### Background

The militaristic history of nuclear energy began with the development of atomic weapons during World War II, culminating in the bombings of Hiroshima and Nagasaki in 1945.<sup>14</sup> In the aftermath of the war, the potential for nuclear energy as a source of power became increasingly evident, leading to a geopolitical race among major powers to harness its potential for civilian use. This led to the establishment of international agreements and organizations, such as the Atoms for Peace initiative proposed by U.S. President Dwight D. Eisenhower in 1953, aimed at promoting the

<sup>&</sup>lt;sup>9</sup> IAEA. The Statute of the IAEA.

<sup>&</sup>lt;sup>10</sup> Ibid.

<sup>&</sup>lt;sup>11</sup> Priest. IAEA Bulletin. IAEA Safeguards and the NPT: Examining Interconnections. 1995.

<sup>&</sup>lt;sup>12</sup> IAEA. The Statute of the IAEA.

<sup>13</sup> Ibid.

<sup>&</sup>lt;sup>14</sup> United Nations - Peace, Dignity and Equality on a Healthy Planet. *Global Issues - Atomic Energy*.

peaceful use of nuclear energy while preventing its misuse for military purposes.<sup>15</sup> As part of these efforts, the IAEA was founded in 1957 as a specialized agency of the United Nations to oversee the development and regulation of nuclear energy worldwide, with a focus on ensuring its safe and peaceful use while preventing nuclear proliferation.<sup>16</sup> One of the chief tasks of the IAEA was to establish safeguards measures with Member States, which are sets of procedures and protocols that ensure nuclear materials and facilities were used exclusively for peaceful purposes and were not diverted for military or other unauthorized activities.<sup>17</sup> These measures are guided by Safeguard Agreements<sup>18</sup> and the *Nuclear Non-Proliferation Treaty* (1968).<sup>19</sup> The energy potential of nuclear material was recognized in the 28th Conference of the Parties to the UN Framework Convention on Climate Change (COP28), especially relating to decarbonizing energy sources.

A nuclear facility is one where nuclear material is produced, processed, used, handled, stored, or disposed of; any facility performing one or multiple of these actions requires an authorization or license for operation.<sup>20</sup> As of 2023, there were 413 operating nuclear reactors across the world, spread between 32 countries, with 58 new power plants under construction.<sup>21</sup> Also, 12 countries relied on nuclear energy for more than 25% of their total electricity.<sup>22</sup> To make sure these facilities and power plants are following IAEA Safety Standards, around 385 inspectors are employed through IAEA to conduct verification activities, such as inspections of inventory and property.<sup>23</sup> The IAEA also monitors the safety of these facilities through measures such as the IAEA International Nuclear Safety Group, which is a speciality advisory body that provides recommendations on nuclear safety matters and techniques to the IAEA and Member States.<sup>24</sup>

The IAEA implements safeguard measures through a combination of inspections, monitoring, and verification activities to ensure that nuclear materials and facilities are used exclusively for peaceful purposes and not diverted for military or unauthorized activities.<sup>25</sup> These measures include conducting regular inspections of declared nuclear facilities, such as nuclear power plants and research reactors, to verify the accuracy of inventory reports and ensure compliance with safeguard agreements.<sup>26</sup> The IAEA also employs remote monitoring technologies, such as surveillance cameras and seals, to continuously monitor nuclear facilities and detect any anomalies or deviations from expected behavior.<sup>27</sup> Additionally, the IAEA collects environmental samples from in and around nuclear facilities to detect the presence of nuclear materials and assess potential

<sup>&</sup>lt;sup>15</sup> Eisenhower Presidential Library. "Atoms for Peace" Address before the General Assembly of the United Nations on Peaceful Uses of Atomic Energy. 1953.

<sup>&</sup>lt;sup>16</sup> IAEA. History.

<sup>&</sup>lt;sup>17</sup> IAEA. Safeguards explained.

<sup>&</sup>lt;sup>18</sup> Ibid.

<sup>&</sup>lt;sup>19</sup> IAEA. Serving Nuclear Non-Proliferation. 2023.

<sup>&</sup>lt;sup>20</sup> IAEA. IAEA Nuclear Security Glossary - Terminology Used in IAEA Nuclear Security Guidance. 2020.

<sup>&</sup>lt;sup>21</sup> IAEA. Nuclear Power Reactors in the World. 2023.

<sup>&</sup>lt;sup>22</sup> Ibid.

<sup>&</sup>lt;sup>23</sup> IAEA. A Day in the Life of a Safeguards Inspector. 2016.

<sup>&</sup>lt;sup>24</sup> IAEA. International Nuclear Safety Advisory Group (INSAG).

<sup>&</sup>lt;sup>25</sup> IAEA. Safeguards explained.

<sup>&</sup>lt;sup>26</sup> IAEA. Safeguards Implementations Practices Guide on Establishing and Maintaining State Safeguards Infrastructure. 2018.

<sup>&</sup>lt;sup>27</sup> Ibid.

breaches of safeguard obligations.<sup>28</sup> Through these comprehensive safeguard measures, the IAEA plays a critical role in promoting nuclear non-proliferation and ensuring the safe and peaceful use of nuclear energy worldwide.

### Safety - Waste Disposal

Nuclear facilities pose safety hazards to humans due to the potential for radiation exposure, which can lead to acute and chronic health effects such as radiation sickness, cancer, and genetic mutations. Additionally, accidents or incidents at nuclear facilities can result in the release of radioactive materials into the environment, contaminating air, water, and soil, and potentially exposing nearby populations to radiation hazards. The long-term environmental impacts of nuclear accidents can include ecosystem disruption, loss of biodiversity, and contamination of food chains, with consequences for both wildlife and human populations residing in affected areas, though it can be hard to measure since it can take many years for these impacts to come into effect.<sup>29</sup> These impacts can be seen particularly in the years following the Chernobyl accident in 1986 as well as the Fukushima accident of 2011. To avoid these adverse health impacts on both humans and the environment, it is important that nuclear material is safely managed and disposed of.

Despite the importance of disposal, only 19% of solid radioactive waste is in a stage of final disposal, leaving over 30 million cubic meters not yet safely disposed of as of 2022.<sup>30</sup> Also, it is estimated that 66% of waste is in storage, waiting to be reprocessed or disposed of.<sup>31</sup> Allowing nuclear waste to sit in storage facilities for extended periods poses significant risks. Nuclear waste remains highly radioactive for thousands of years, emitting harmful radiation that can degrade storage containers and materials over time, potentially leading to leaks or breaches.<sup>32</sup> Also, the longer nuclear waste remains in storage, the greater the security concerns, as facilities require robust measures to prevent unauthorized access and potential theft of radioactive materials for malicious purposes. Storage facilities may not always be designed to withstand natural disasters, which could compromise containment and lead to environmental contamination, posing risks to ecosystems and public health.<sup>33</sup>

The IAEA ensures that nuclear waste disposal facilities comply with applicable international safety standards and regulatory requirements. This includes reviewing and assessing the design, operation, and management of disposal facilities to ensure that they meet established safety criteria and minimize potential risks to human health and the environment, as emphasized by General Assembly resolution 76/35.<sup>34</sup> This is done through avenues such as inspections, monitoring, and mechanisms like the Integrated Review Service for Radioactive Waste and Spent Fuel Management, Decommissioning, and Remediation (ARTEMIS).<sup>35</sup> The IAEA also conducts environmental monitoring programs to assess the impact of nuclear waste disposal on air, water,

<sup>&</sup>lt;sup>28</sup> Ibid.

<sup>&</sup>lt;sup>29</sup> UN Environment Programme. *Radiation: Effects and Sources*. 2016.

<sup>&</sup>lt;sup>30</sup> IAEA. Status and Trends in Spent Fuel and Radioactive Waste Management. 2022.

<sup>&</sup>lt;sup>31</sup> Ibid.

<sup>&</sup>lt;sup>32</sup> UN Environment Programme. *Radiation: Effects and Sources*. 2016.

<sup>&</sup>lt;sup>33</sup> Ibid.

<sup>&</sup>lt;sup>34</sup> United Nations General Assembly. Prohibition of the dumping of radioactive wastes (A/RES/76/35). 2022.

<sup>&</sup>lt;sup>35</sup> IAEA. Integrated Review Service for Radioactive Waste and Spent Fuel Management, Decommissioning, and Remediation (ARTEMIS).

soil, and ecosystems.<sup>36</sup> This involves sampling and analyzing environmental media to detect and quantify any radioactive contamination resulting from waste disposal activities.<sup>37</sup>

### Security - Transportation and Inventory Management

The security of nuclear facilities and material is important to prevent the misuse of nuclear material for illicit purposes. Security measures mitigate the risk of unauthorized access, theft, or sabotage, safeguarding against potential threats to national and international security. According to the IAEA Nuclear Security Review 2023, over 20 million packages containing radioactive or nuclear material are transported worldwide, with 52% of thefts occurring during transport.<sup>38</sup> The Nuclear Security Fund's expenditures increased by over 50% in 2022, indicating recognition of gaps in existing security infrastructure.<sup>39</sup> Another prevalent issue is the appropriate management of inventory. Inspections of power reactor sites show that about 75% of sites violate standards for inventory management, such as the keeping and maintaining of records, the conducting of a physical inventory once every 12 months, and following processes relating to the control and account of nuclear material.<sup>40</sup> Without appropriate safeguard measures regarding transport and inventory of nuclear materials, it is difficult to ensure appropriate management of the material itself. With the right safeguards, the IAEA can increase the security of nuclear facilities and material to prevent thefts and disturbances.

Security of nuclear facilities has been identified as a priority of the United Nations, as seen in documents such as the *Convention on the Physical Protection of Nuclear Material* (CPPNM).<sup>41</sup> and the *International Convention for the Suppression of Acts of Nuclear Terrorism* (A/CPPNM).<sup>42</sup> The IAEA has attempted to increase security of nuclear material during transportation through its *Code of Conduct on the Safety and Security of Radioactive Sources*.<sup>43</sup> This is a set of voluntary guidelines that Member States can utilize in order to strengthen their security around nuclear facilities and material, including during transportation. Additionally, the IAEA manages the Incident and Trafficking Database, which was created in 1995 to collect, analyze, and share information relating to unauthorized possession, theft, loss, or trafficking of nuclear and radioactive materials.<sup>44</sup> This database functions as a knowledge-sharing repository, as it not only tracks incidents involving nuclear material but also offers information relating to how the incident occurred, which states may use in order to strengthen their own processes and facilities to prevent future issues.<sup>45</sup> On issues relating to inventory, the Security Council has passed resolutions such as 1540 (2004)<sup>46</sup> and 1887 (2009),<sup>47</sup> which requires all Member States to establish and enforce

45 Ibid.

<sup>&</sup>lt;sup>36</sup> IAEA. Programmes and Systems for Source and Environmental Radiation Monitoring. 2010.

<sup>&</sup>lt;sup>37</sup> Ibid.

<sup>&</sup>lt;sup>38</sup> IAEA. Nuclear Security Review 2023.

<sup>&</sup>lt;sup>39</sup> Ibid.

<sup>&</sup>lt;sup>40</sup> IAEA. Safeguards Implementations Practices Guide on Establishing and Maintaining State Safeguards Infrastructure. 2018.

<sup>&</sup>lt;sup>41</sup> IAEA. Convention on the Physical Protection of Nuclear Material (CPPNM). 1979.

<sup>&</sup>lt;sup>42</sup> IAEA. International Convention for the Suppression of Acts of Nuclear Terrorism (A/CPPNM). 2005.

<sup>&</sup>lt;sup>43</sup> IAEA. Code of Conduct on the Safety and Security of Radioactive Sources. 2004.

<sup>&</sup>lt;sup>44</sup> IAEA. Incident and Trafficking Database (ITDB).

<sup>&</sup>lt;sup>46</sup> Security Council. Resolution 1540 (2004).

<sup>&</sup>lt;sup>47</sup> Security Council. Resolution 1887 (2009).

effective measures to secure nuclear materials, including through comprehensive inventory management.

By meticulously tracking the movement and storage of nuclear materials, the IAEA helps prevent their unauthorized access, theft, or diversion for illicit purposes. This monitoring encompasses regular inspections, audits, and physical inventories to verify the quantity, composition, and status of nuclear materials, as well as stringent safeguards during transportation to mitigate risks during transit. Through these measures, the IAEA strengthens global efforts to safeguard nuclear materials and facilities, thereby promoting international peace, security, and the prevention of nuclear proliferation.

### Nonproliferation and Disarmament

Nonproliferation and disarmament have become increasingly critical in the face of growing global nuclear capabilities. As more states develop the capacity to harness and weaponize nuclear energy, the risk of proliferation and the spread of nuclear weapons technology escalates. Nuclear facilities play a crucial role in the production of nuclear weapons by providing the infrastructure and resources necessary for the development, enrichment, and processing of nuclear materials.<sup>48</sup> These facilities, such as uranium enrichment plants, nuclear reactors, and reprocessing facilities, enable states to produce fissile material, such as highly enriched uranium (HEU) or plutonium, which are key components of nuclear weapons.<sup>49</sup> Therefore, nuclear facilities serve as the foundational infrastructure for the production and proliferation of nuclear weapons, highlighting the importance of effective safeguards and nonproliferation efforts to prevent their misuse. Additionally, the Secretary-General's remarks to the Security Council identifies disarmament and non-proliferation as the only path forward guaranteeing global safety and security in regards to the threat of nuclear weapons.<sup>50</sup>

The UN and its affiliated bodies closely monitor several states and areas of concern regarding nuclear nonproliferation and disarmament. One notable area under scrutiny is the Middle East, where instability and conflicts have heightened proliferation concerns, notably exemplified by Iran's nuclear program. Iran's uranium enrichment activities and suspected military dimensions have drawn significant international attention, resulting in sanctions due to violations of the Non-Proliferation Treaty (NPT) and the Joint Comprehensive Plan of Action (JCPOA).<sup>51</sup> Despite these challenges, Iran has shown cooperation with the International Atomic Energy Agency (IAEA) through verification and monitoring activities, as stipulated by past UN resolutions such as Security Council Resolution 2231, aimed at curbing further nuclear weapons development.<sup>52</sup> Efforts to enhance peace and security in the region include initiatives like the Conference on the Establishment of a Middle East Zone Free of Nuclear Weapons and Other Weapons of Mass Destruction. This conference, attended by all Middle Eastern states except Israel, focused on

<sup>&</sup>lt;sup>48</sup> IAEA. What is Nuclear Energy? The Science of Nuclear Power. 2022.

<sup>&</sup>lt;sup>49</sup> Ibid.

<sup>&</sup>lt;sup>50</sup> United Nations. Secretary-General's remarks to the Security Council - on Nuclear Disarmament and Non-Proliferation. 2024.

<sup>&</sup>lt;sup>51</sup> IAEA. IAEA and Iran - IAEA Board Reports.

<sup>&</sup>lt;sup>52</sup> Ibid.

crafting a new treaty specific to the Middle East aimed at non-proliferation and disarmament.<sup>53</sup> The fourth session of the Conference in 2023 specifically recognized Israel as a rising nuclear security threat, urging Israel to sign the NPT.<sup>54</sup>

Other UN efforts toward nuclear disarmament include the establishment of the United Nations Institute for Disarmament Research (UNIDIR) in 1980. A recent report indicates that nuclear threats are at a historical high due to the unsuccessful establishment of a nuclear-weapon-free-zone in the Middle East, the Iran nuclear program, Russia's threats of possible use of nuclear weapons and attacks against nuclear reactors, and the lack of global security caused by the Democratic People's Republic of Korea's nuclear arsenal.<sup>55</sup> The 2022 Non-Proliferation Treaty Review Conference, while not culminating in a fully consensus-driven outcome document due to objections from the Russian Federation, nonetheless provided a valuable forum for identifying obstacles to nuclear disarmament.<sup>56</sup> This identification serves as a crucial step towards addressing and mitigating these challenges in preparation for the next session in 2026.<sup>57</sup> Additionally, the Conference recognized the IAEA for its steadfast commitment to non-proliferation efforts through its comprehensive inspections and vigilant monitoring of nuclear facilities worldwide.<sup>58</sup> By effectively preventing proliferation, these measures inherently contribute to the broader goal of disarmament.

### Conclusion

The IAEA plays a vital role in promoting nuclear safety, security, and nonproliferation and disarmament regarding nuclear material and facilities. It establishes safety standards, conducts safety reviews, and provides technical assistance to enhance safety. For security, it develops guidelines, conducts assessments, and assists Member States in strengthening security capabilities, encompassing physical protection, cybersecurity, and prevention of illicit trafficking. The IAEA also plays a critical role in disarmament and nonproliferation efforts by promoting the peaceful use of nuclear energy while preventing the spread of nuclear weapons.

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<sup>&</sup>lt;sup>53</sup> United Nations General Assembly. *Report of the Conference on the Establishment of a Middle East Zone Free of Nuclear Weapons and Other Weapons of Mass Destruction on the work of its third session.* 2022.

<sup>&</sup>lt;sup>54</sup> United Nations General Assembly. Report of the Conference on the Establishment of a Middle East Zone Free of Nuclear Weapons and Other Weapons of Mass Destruction on the work of its fourth session. 2023.

<sup>&</sup>lt;sup>55</sup> UNIDIR. *Reflections on Review Conferences: The NPT, the Biological Weapons Convention and the Chemical Weapons Convention.* 2023.

<sup>&</sup>lt;sup>56</sup> United Nations - Meetings Coverage and Press Releases. *Non-Proliferation Treaty Review Conference Ends without Adopting Substantive Outcome Document due to Opposition by One Member State*. 2022.

<sup>&</sup>lt;sup>57</sup> Ibid.

<sup>&</sup>lt;sup>58</sup> Ibid.

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Questions to consider:

- 1. Consider the stages of development of Member States–which ones have and utilize nuclear energy and technology? Which ones do not?
- 2. What is the responsibility of the IAEA in safeguard measures, and what is the responsibility of states?
- 3. What safeguard measures tend to be successful? Are there any that are not?
- 4. Does your state use nuclear energy? In what ways? If not, why?
- 5. Of all possible solutions and recommendations for this topic, what recommendations can you make that are within the mandate of the IAEA?

Helpful links:

https://www.iaea.org/resources/safety-standards/search

What is Nuclear Energy? The Science of Nuclear Power | IAEA

https://www.iaea.org/resources/publications/iaea-nuclear-safety-and-security-glossary

https://www.iaea.org/sites/default/files/16/12/legalframeworkforsafeguards.pdf

https://www.iaea.org/sites/default/files/20/06/emerging-tehnologies-workshop-290120.pdf

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Regional organizations: African Unionhttps://www.au.int/

Arab Leaguehttp://www.arableagueonline.org/

Association of South East Asian Nationshttp://asean.org/

Asian Cooperation Dialoguehttp://www.acd-dialogue.org/

European Unionhttps://europa.eu/european-union/index\_en

Economic Community of West African Stateshttp://www.ecowas.int/

Organization of American Stateshttp://www.oas.org/en/

Pacific Islands Forumhttp://www.forumsec.org/

Union of South American Nationshttp://www.unasur.int/en

International Agencies Europolhttps://www.europol.curopa.cu/

International Police Associationhttp://www.ipa.-jac.org/

INTERPOL - <u>https://www.interpol.int/</u>

International Criminal Courthttps://www.icc-cpi.int/

United Nations Entities International Peace and Securityhttp://www.un.org/en/sections/priorities/international-peace-and-security/ Office for the Coordination of Humanitarian Affairshttps://www.unocha.org/