Hanyang Model United Nations VIII

Chair Report

Committee: United Nations Environmental Programme (UNEP)

Chairs: Taerin Kim, Yujin Kim

Agenda: Exploring measures for the sustainable use of nuclear energy and the development of effective solutions for nuclear waste management to minimize environmental and health impacts.

1. Committee Introduction

The United Nations Environment Programme (UNEP) is the leading global authority on environmental matters. Throughout the history of over 50 years, UNEP has endeavored to inspire, inform, and enable nations and individuals to enjoy improved quality of life, while preserving a sustainable future for the next generations. Founded one year after the historic United Nations Conference on the Human Environment in Stockholm, the UNEP has emerged as a cornerstone for the United Nations system of global environmental governance and cooperation.

UNEP has been addressing the triple critical planetary crises, which are climate change, biodiversity loss, and pollution. These environmental crises are threatening our everyday survival. The world needs urgent, meaningful, combined, and collective action to solve these problems. UNEP is uniquely positioned to address the triple planetary crisis. With

its experience, expertise, dynamic programs, forward-thinking strategy, and dedicated staff, UNEP guides nations on the right path toward a sustainable planet. As global environmental challenges intensify, UNEP's work has never been more essential.

Since the environmental challenges have no borders and are too large and too complicated for any single entity to address alone, UNEP has been collaborating closely with governments, environmental conventions, the scientific community, academia, private sector, civil society, international and regional organizations, global funds, the financial sector, philanthropies, individuals, UN entities and others. During the last five decades, it has worked in firm association with governments, civil society, private business concerns, and UN agencies on issues ranging from the restoration of the ozone layer and protection of the oceans to greening and economic growth that is inclusive of all. ("UNEP – Your Partner" 4). UNEP works in partnership with its 193 member states and other stakeholders through the UN Environment Assembly, the highest level of global decision-making authority on environmental issues, reinforcing the organization's capacity to set the global environmental agenda.

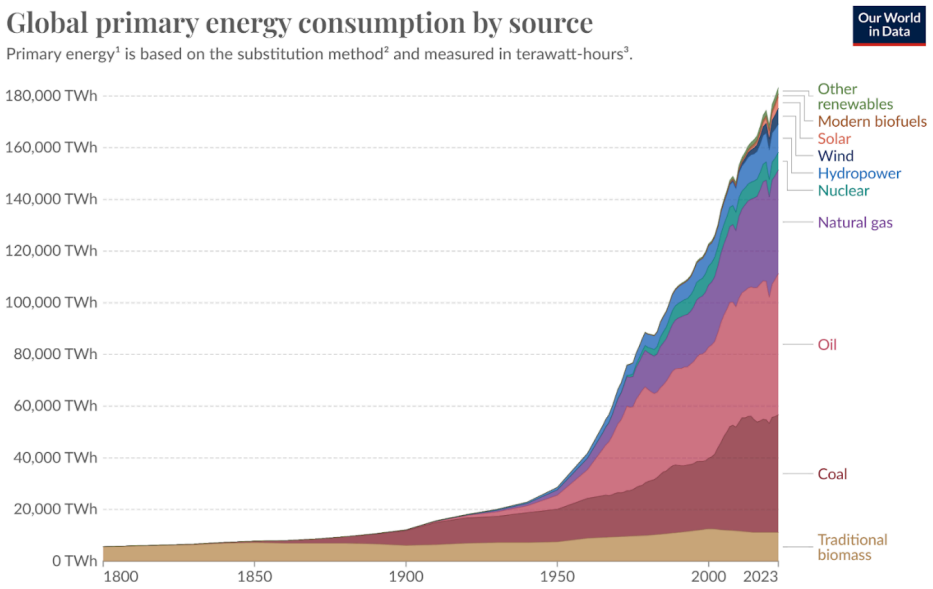
Under its mandate, the committee promotes dialogue among member states, promotes science-based decision-making, and ensures environmental concerns are prioritized in international discussions. Through its various programs on issues such as supporting the transition to low-carbon and resource-efficient economies, strengthening environmental governance, and safeguarding ecosystems, UNEP embodies multilateral cooperation for effective solutions ("UNEP – Your Partner" 6). Its scope involves UNEP's integrated strategies that address the triple planetary crisis while supporting all 17 SDGs. Through the promotion of circular economies and decoupling of economic growth from environmental degradation, UNEP accordingly supports countries to do more with less and enhance the quality of life with reduced strain on resources for coming generations ("About Us").

The key role of the UNEP committee also involves acting as a vehicle for interborder partnerships by knitting the necessary inputs from scientists, policy thinkers, and non-governmental organizations into the formulation of comprehensive and farsighted policies. This integrated approach allows developing countries to gain access to vital tools, technologies, and financial mechanisms that are essentially required for sustainable development. Such collaborations prove UNEP's commitment to South-South and triangular

cooperation in enhancing the world's potential for much better management of environmental concerns ("UNEP – Your Partner" 5; "About Us"). In addition, UNEP depends upon scientific evidence from credible sources, which means that the work of the committee is based on credibility itself. Grander reports, such as the Global Environment Outlook and Making Peace with Nature, assist in aligning national policy with global sustainability objectives in keeping with UNEP's vision for a pollution-free, climate-stable world ("UNEP – Your Partner" 8).

The Committee emphasizes that environmental sustainability is inseparable from economic and social development, per the SDGs. UNEP's work in public advocacy, education, and partnerships brings awareness and motivates action to help member states and communities make a difference. Committee meetings themselves, whereby member states can consult with one another and negotiate solutions, cement those commitments into concrete progress. The special position of UNEP allows it to broker complex issues, build consensus among its member states of 193, and use collective action as a core strategy. In support, of the acceleration of climate change impacts and resource depletion, UNEP is committed to aligning committee discussions with its Medium-Term Strategy for relevance and ineffectiveness in addressing contemporary environmental crises ("UNEP – Your Partner" 11, 15-16; "About Us.").

2. Agenda Background



1. Global primary energy consumption by source (IEA)

Regarding energy supply, the world has been depending on fossil fuels for decades. According to Figure 1, in 2023, global primary energy consumption by fossil fuels was approximately 76%. Thanks to fossil fuels, the world was able to rapidly develop. Unfortunately, several problems derived from fossil fuels have been recognized. The combustion of excessive fossil fuels has caused environmental pollution, threatening wildlife and human survival. It also contributed to one of the triple planetary crises, climate change. Realizing these negative impacts and considering the finitude and price volatility of fossil fuels, the world has been attempting to transition its energy system.

One of the rising alternatives, renewable energy, like hydropower, wind, and solar, has been expanding its position in energy consumption. According to Figure 1, from 1984 to 2023, the proportion of global primary energy consumption by renewable energy has increased by approximately 6.5 percentage points. However, it is still not insufficient to meet the world's energy demands. Even though renewable energy is safe and clean, the critical downsides of renewable energy, like geographical and climate limitations, high cost, and underdeveloped storage technology, are hindering the increase of renewable energy usage.

Considering this situation, the world has been developing nuclear energy. Nuclear energy can supplement the downsides of fossil fuels and renewable energy. While operating, nuclear energy doesn't cause greenhouse gas emissions, which shows its possibility of green energy. Moreover, nuclear energy is highly efficient compared to other energy sources. With 1 kg of uranium, the nuclear power plant can generate roughly 24,000MWh.

However, there are several crucial drawbacks of nuclear energy that must be considered. Radioactivity has extremely toxic effects on human health and the environment. Exposure to radiation can lead to chronic health disorders, thyroid issues, cell damage, genetic mutations, and an increased risk of cancer. When a pregnant woman gets exposed to radiation, the infant may be born with birth defects. Environmentally, radioactivity can contaminate soil and water, eventually affecting plants, animals, and humans. While operating nuclear power plants and processing nuclear waste, the risk of radioactivity is comprehensively controlled. However, there is still a probability of a radioactivity leak. Making the situation worse, processing nuclear waste faces substantial technological and economic challenges.

By observing the outcome of these accidents, the dire impact of radioactivity on the

environment and all living things is highlighted. Due to the Chernobyl disaster, 31 people immediately lost their lives just by the explosion, and approximately 60,000 residents were exposed to radiation. Furthermore, there were 5,000 cancer-related deaths. Its environmental effect was also staggering. Approximately 1,600 square kilometers were radioactively contaminated, making the huge range of land uninhabitable. In the Fukushima disaster, approximately 2,000 residents were directly impacted, and radioactive substances leaked out into the ocean and affected the planet's marine ecosystems.

Exploring measures for the sustainable use of nuclear energy and achieving social consensus is essential to prevent these tragic incidents from recurring.

3. Previous Actions

a. International Level

i. United Nations (UN)

The United Nations Environment Programme (UNEP) has published guidelines for Strategic Environmental Assessment (SEA) in nuclear power programs. The SEA process includes screening, scoping, stakeholder engagement and public participation, assessment, SEA report, decision-making, monitoring and wider follow-up, and quality review.

Areas that must be considered related to nuclear power are grouped into seven 'nuclear power impact areas.' The assessment of these areas is divided into eight 'environmental impact themes.' These themes detail infrastructure-related environmental effects and broader impacts from the program, as well as impacts on the program.

Meanwhile, by inferring stakeholder engagement and public participation, SEA can help identify and address stakeholder and public acceptance issues while developing nuclear power programs. Thus, SEA can provide a platform for informed and fair public debates.

ii. Conventions

1. **London Convention and its 1996 Protocol**

London Convention and its 1996 protocol prohibit the dumping of radioactive waste at sea. Annex 1 lists materials that might be considered for dumping, but explicitly excludes radioactive wastes. Furthermore, Article 4 of the London Protocol specifically prohibits the dumping of all radioactive wastes at sea, including high-level, low-level, and intermediate-level radioactive wastes.

2. **The Convention on Early Notification of a Nuclear Accident**

In the Convention on Early Notification of a Nuclear Accident, state parties have achieved consent to notify the IAEA and affected states when a nuclear accident occurs within their jurisdiction. Notifications must include the time, location, nature, and other data essential for assessing the situation.

3. **The Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency**

Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, states parties agree to assist in the event of a nuclear accident or radiological emergency, whether the accident occurs within their territory. States parties must notify the IAEA of their available experts, equipment, and materials for assisting in a nuclear accident or radiological emergency. If assistance is requested, each State Party decides whether it can render the requested assistance and its scope and terms.

The Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency were both adopted in 1986 following the Chernobyl nuclear plant accident. Both Conventions emphasize international cooperation and the importance of prompt notification and assistance to minimize the consequences of nuclear accidents and radiological emergencies.

4. **The Convention on Nuclear Safety (CNS)**

The objective of the CNS is to enhance the safety of nuclear

installations by establishing fundamental safety principles. These principles include site selection, design and construction, operation and safety verification, and emergency preparedness. Furthermore, by the peer review process, the state parties ensure compliance with these standards.

b. National Level

i. Africa

African Regional Cooperative Agreement for Research, Development, and Training related to Nuclear Science and Technology (AFRA) is an intergovernmental Agreement established by the African Member States to strengthen and enlarge the contribution of nuclear science and technology to socioeconomic development on the African continent. It provides a framework to intensify its collaboration through programs and projects focused on the specific shared needs of its members. Its activities cover a wide range of peaceful applications of nuclear techniques that contribute to the achievement of national and regional development goals.

ii. Asia

The Asian Nuclear Safety Network (ANSN) was established by the IAEA in 2002 to pool, analyze, and share nuclear safety information, existing and new knowledge, and practical experience among the participating countries. Moreover, the ANSN has expanded to become a forum for broader safety strategy among countries in the region, thus facilitating sustainable regional cooperation and creating human networks and cyber communities among the specialists of those countries. In the Regional Workshop for Central Governments and Regulatory Bodies on the Development of National Strategies and Regulatory Requirements for Decommissioning, held in 2022, the participating countries discussed the decommissioning of nuclear facilities.

iii. Europe

The Radioactive Waste and Spent Fuel Management Directive require all EU countries to establish a national policy for the management of spent

fuel and radioactive waste and to implement national programmes to address these matters. The programmes should cover all types of radioactive waste under the jurisdiction of EU countries and all stages of management of spent fuel and radioactive waste from generation to generation.

Furthermore, every 3 years, EU countries submit national reports on the implementation of the directive to the Commission. Based on those, the Commission drafts a report on the overall implementation of the directive and an inventory of radioactive waste and spent fuel present in the Community's territory and the prospects.

iii. North America

1. the United States of America

The Department of Energy (DOE) oversees the treatment and disposal of radioactive waste. The United States has over 90,000 metric tons of spent nuclear fuel from commercial nuclear power plants. The United States Nuclear Regulatory Commission (U.S.NRC) regulates the storage and disposal of all commercially generated radioactive wastes in the United States.

NRC regulations (10 CFR Part 61) establish procedures, criteria, terms, and conditions for licensing low-level waste disposal sites. Part 61 also provides the basis for Agreement State regulations, since state rules must be compatible with NRC requirements. There have been eight operating commercial facilities in the United States licensed to dispose of low-level radioactive wastes. They are in Washington, Utah, South Carolina; and Texas.

However, unlike low-level waste, almost all existing commercial high-level waste is unprocessed spent fuel since there is no commercial reprocessing of nuclear power fuel in the United States.

2. Canada

In Canada, nuclear power reactors are located in Ontario, Quebec, and

New Brunswick. Canada's used nuclear fuel is currently stored at existing reactor sites in Ontario, Quebec, and New Brunswick, as well as at a laboratory in Manitoba. As of 2023, Canada's existing inventory is about 3.3 million used nuclear fuel bundles. At the end of the planned operation of Canada's existing nuclear reactors, the number of used fuel bundles could total about 5.6 million. The Nuclear Waste Management Organization (NWMO) is also monitoring multiple small modular reactors (SMR) projects closely to prepare for decisions that could change the volume and type of waste.

iv. South America

The IAEA's Technical Cooperation Program has significantly improved the capacity of Latin American and Caribbean countries to manage radioactive waste and disused radioactive sources. Through training and workshops, staff and professionals have enhanced their capacity to develop essential safety documents, such as regulations and safety guidelines for assessment, licensing, and inspection of facilities. Prototypes of national policy and strategy, model regulation, and guides for the licensing of centralized storage facilities were developed and implemented in participating countries. Considerable progress was also made in developing and controlling radioactive waste inventories. Additionally, an important number of orphan sources were recovered and safely stored with the assistance of international experts.

4. Possible Actions

a. Generation IV reactors and Small Modular Reactors (SMRs)

Small modular reactors (SMRs) are built by using Generation IV reactor technologies. Generation IV reactors and SMRs have various benefits compared to traditional technology. Generation IV reactors and SMRs are more safe and efficient. Furthermore, Generation IV reactors and SMRs can reduce the amount of nuclear waste. Generation IV reactors have better fuel efficiency. Meanwhile, SMRs are smaller. Thus, it is easier to use in remote locations.

b. Partitioning and Transmutation (P&T)

P&T is one of the methods of effective waste management. By using P&T, it is able to store larger amounts of nuclear waste in the same repository compared to the traditional method, eventually leading to the reduction of the area polluted by radiotoxicity. This is possible because P&T reduces the volume of the nuclear waste and heat load for deep geological storage.

c. Reinforcing International Regulation

Simply adopting advanced technologies is not enough. The world currently needs consolidated regulation on nuclear power installation and the management of nuclear waste.

5. Defining of Key Words

a. Nuclear Energy

Nuclear energy is a form of energy released from the nucleus, the core of atoms, made up of protons and neutrons.

b. Nuclear/Radioactive Waste

Nuclear waste, also called radioactive waste, is any radioactive material in gaseous, liquid, or solid form that is not going to be used any longer in the country of origin, or the destination country. Radioactive waste is a byproduct of nuclear reactors, fuel processing plants, hospitals, and research facilities. Radioactive waste is also generated while decommissioning and dismantling nuclear reactors and other nuclear facilities. There are two broad classifications: high-level and low-level waste.

c. High-Level Waste

High-level radioactive waste primarily is uranium fuel that has been used in a nuclear power reactor and is "spent," or no longer efficient in producing electricity. High-level wastes are hazardous because they produce fatal radiation doses during short periods of direct exposure.

d. Low-Level Waste

Low-level wastes, generally defined as radioactive, come from reactor operations and medical, academic, industrial, and other commercial uses of radioactive materials. Low-level waste includes items that have become contaminated with radioactive material or have become radioactive through exposure to neutron radiation. This waste typically consists of contaminated protective shoe covers and clothing, wiping rags, mops, filters, reactor water treatment residues, equipment and tools, luminous dials, medical tubes, swabs, injection needles, syringes, and laboratory animal carcasses and tissues. The radioactivity can range from just above background levels found in nature to much higher levels in certain cases, such as parts from inside the reactor vessel in a nuclear power plant.

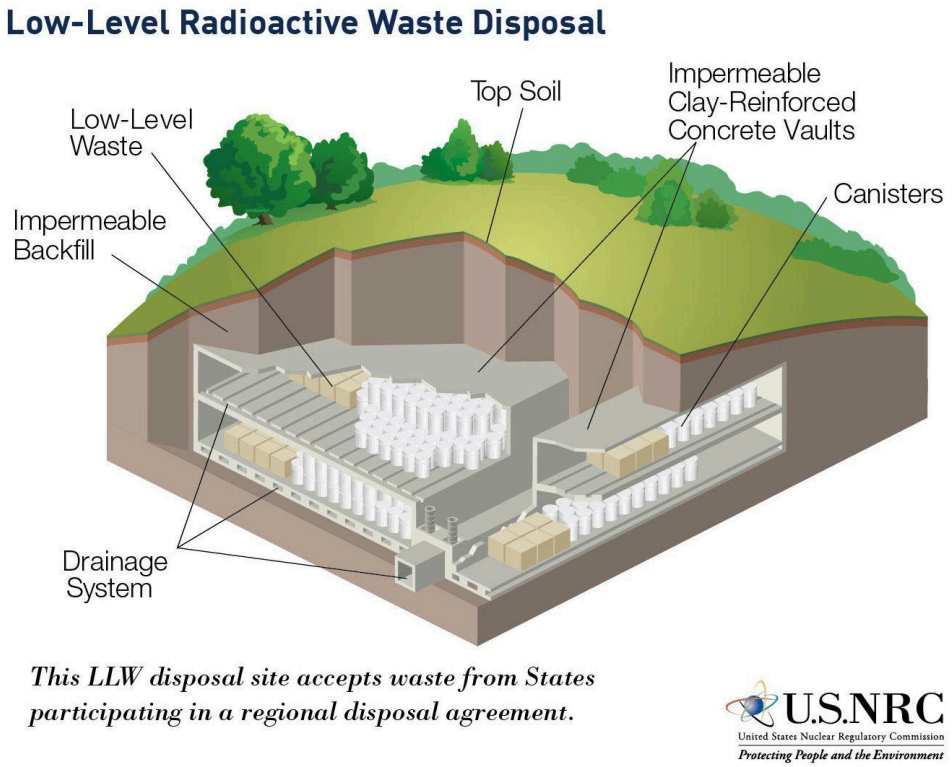


Figure 2.

Low-level waste is typically stored on-site by licensees, either until it has decayed away and can be disposed of as ordinary trash, or until amounts are large enough for shipment to a low-level waste disposal site in approved containers.

e. Partitioning and Transmutation (P&T)

P&T is an advanced method for managing radioactive waste by reducing its long-term radiotoxicity and volume.

Partitioning involves separating the long-lived radioactive elements (actinides) from the spent nuclear fuel. This is typically done through chemical processes that isolate elements like plutonium, neptunium, americium, and curium from the rest of the waste.

Transmutation is the process of converting these long-lived radioactive elements into shorter-lived or stable isotopes through nuclear reactions. This is usually achieved in specially designed reactors, such as fast neutron reactors, which can effectively induce fission in these elements, thereby reducing their radiotoxicity and heat generation.

6. Key Questions/Questions to Consider

a. How can international regulation be reinforced upon safely operating nuclear power plants?
b. What kind of economical and technological assistance could be provided to developing nations to apply safer methods of processing nuclear energy?
c. What international regulations are needed to supplement the downsides of the current cutting-edge technology?
d. How can the international regulation be reinforced to lead the nations to dispose of nuclear waste with the least hazardous method?
e. What incentive could be provided to an international agreement prohibiting disposal of nuclear waste into the ocean, like the London Convention, be expanded to other nations?

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