



International Atomic Energy Agency

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International Atomic Energy Agency (IAEA)

Letter from the Chairs

Honorable Delegates,

Welcome to the first iteration of Wilder Model United Nations. As your chairs, Caitlyn Collins and Sandy Erijarla, we are excited to welcome you to the International Atomic Energy Agency. We will be discussing two topics: The first topic in the IAEA is nuclear proliferation, while our second topic is the sustainability of nuclear energy.

Caitlyn Collins is one of the co-chairs in IAEA. She is an 8th grader who enjoys many activities including creating art, specifically painting and drawing. She also enjoys swimming for NOVA and her neighborhood swim team along with participating in math club, competing in competitions such as Perennial Math, AMC 8, AMC 10, and Math Counts.

Sandy Erijarla is another co-chair in IAEA. She is also an 8th grader who participates in numerous clubs, including Model UN, TSA, NJHS, and Math Club. She also participates in musically-inclined hobbies like the cello and piano.

In order to do the best you can, it is important that you prepare well, and ignite your problem-solving, critical thinking, and communication skills. You can efficiently prepare by writing a position paper– while unrequired, it is mandatory if you are interested in getting an award. The sources you use to create your position paper must be cited in MLA 9 formatting, or else you will be disqualified for plagiarism. Critical thinking allows delegates to address problems and identify ways to improve or solve these problems. Additionally, problem solving skills help delegates create solutions that completely address the problem which can lead to better results from the solutions. Communication is also a key skill that delegates should use. Good communication can help delegates display their ideas thoroughly and successfully collaborate with other delegates to create better solutions and ideas. Overall, these skills enable delegates to perform the best they can.

We look forward to having you at WMUN, and hope you have a great time there! If you have any questions or concerns, please send an email to wildermodelun@gmail.com.

Your Chairs,

Sandy Erijarla and Caitlyn Collins

WMUN I

Wilder Model UN Conference

Topic I: Nuclear Proliferation

Topic II: The Sustainability of Nuclear Energy

Committee Overview:

The International Atomic Energy Agency, also known as IAEA, is an international organization associated with the United Nations. It was founded in 1957 as a result of concerns over the increased research, development, and use of nuclear technology. One of the IAEA's main goals is to promote research and use of nuclear technology for peaceful purposes. Although the IAEA promotes a peaceful use of nuclear technology, the agency aims to decrease any use of military technology for military purposes. This is done by establishing agreements between the IAEA and states. There are IAEA headquarters and one of the agency's nuclear technology laboratories in Vienna Austria along with more laboratories located in Seibersdorf, Austria and Monaco. Alongside the

headquarters, many offices are placed around the world, such as the regional offices in Tokyo, Japan, Toronto, Canada, Geneva, Switzerland, and New York City, United States.

Presently, the IAEA is led by general director Rafael Mariano Grossi.

Additionally, the agency is involved in multiple agreements and treaties, including, but not limited to: the Non-Proliferation Treaty (NPT), the Treaty for The Prohibition of Nuclear Weapons, and multiple treaties establishing nuclear-free-zones in many regions. Many of these treaties aim to reduce the proliferation of nuclear weapons, also described as the spread of information, materials, and/or weapons that can be used in threatening ways if the wrong people get access to it. Moreover, despite nuclear proliferation being negative, the IAEA tries

to promote peaceful uses of nuclear technology such as a source of energy. Nuclear energy can be a controversial topic, as there are both pros and cons concerning it, yet it is still a peaceful, helpful way to put nuclear technology to use.

Overall, the IAEA promotes peaceful and safe use of nuclear energy, a very relevant topic in the world today. Furthermore, the IAEA plays a large role in many agreements and treaties that ensure security across the globe, making it a vital part of the UN.

Topic 1: Nuclear Proliferation

Introduction:

A little bit less than 100 years ago, the 1930s specifically, scientific discoveries led to nuclear technology. From that point on, many countries have developed uses for this technology, such as nuclear weapons and energy sources. While not all nuclear technology is harmful, nuclear weapons happen to pose a large threat to the world. Additionally, nuclear proliferation is the spreading of nuclear weapons, materials,

and information regarding them. Nuclear proliferation harms people and countries in many ways, especially if weapons fall into the wrong hands. Many efforts like treaties and agreements have been made by organizations such as the UN to prevent nuclear proliferation, yet it still proves to be a problem as an estimated 12,100 nuclear warheads are possessed between at least ten countries.

The Creation and First Use of Nuclear Weapons:

Resulting from scientific discoveries in the 1930s, nuclear technology was created, often being used for weapons. For a few years after nuclear technology was invented, nuclear weapons were not produced or used, as the nuclear components in the weapons can cause massive destruction. Although they weren't used at first, the U.S. started producing nuclear weapons in 1942 in fear of other countries creating them first. This production and creation of the weapons was known as the Manhattan project.

On August 6th, 1945, the U.S. was the first to use a nuclear weapon in warfare, dropping a bomb on Hiroshima, Japan. Three days later on August 9th, a second nuclear bomb was dropped on Nagasaki, Japan. The bombs killed around 140,000

people in Hiroshima and 74,000 people in Nagasaki, creating around 214,000 estimated fatalities overall. Additionally, people who survived the bombings suffered from a variety of health problems such as cancer and many other side effects from radiation. After the bombings of Hiroshima and Nagasaki, it was very difficult to provide aid to victims because many of the healthcare professionals were dead and the hospitals in the area were unusable. This event truly showed how devastating nuclear weapons can be to people, cities, countries, and the world. This is still the last use of a nuclear weapon in warfare even up until today, as the U.S. has been the first to use a nuclear weapon in warfare and the last so far.

History of Nuclear Proliferations and Issues Surrounding It:

After the bombing of Hiroshima and Nagasaki, many concerns and issues began to arise. This and other causes eventually led to the creation of the International Atomic Energy Agency (IAEA) in July, 1957. The purpose of creating the IAEA was to promote peaceful uses of nuclear technology, while also discouraging and preventing nuclear proliferation.

One of the issues of nuclear proliferation is the safety of those possessing

it. This is shown in September, 1957, when a tank of nuclear waste exploded in Ozyorsk, the former location of the Soviet Union's nuclear weapons program. While this incident was covered up by the Soviet government initially, it was later exposed by an exiled Soviet scientist. This situation was called the Kyshtym disaster.

While the Kyshtym disaster shows the dangers of nuclear weapons to their owners, nuclear weapons can also be a large threat in conflicts. For example, during the Cold War in October, 1962, the U.S. found Soviet missiles in the process of construction in Cuba. This caused widespread panic in the U.S. as they were under the threat of nuclear weapons and the massive destruction that came with them, just around 100 miles away from the Florida coast. While this event escalated to large heights and reawakened fears of nuclear threats, a resolution to the conflict was eventually reached when the U.S. Navy surrounded Cuba. Both the U.S. and the Soviet Union agreed to remove weapons from certain areas, specifically Cuba for the Soviet Union and Turkey for the U.S. Even though the conflict was resolved, it was still one of the closest the world has been to a nuclear war. Today it's known as the Cuban missile crisis.

In the years following the Cuban missile crisis, many efforts, including treaties, were made to reduce the threat of nuclear conflict and proliferation. On February 14th, 1967, the first nuclear weapon free-zone (NWFZ) was established in Latin America with the Treaty of Tlatelolco. Many other countries and areas followed Latin America's example, as the South Pacific countries established a NWFZ in 1985, Southeast Asia established a NWFZ in 1995, Africa established one in 1996, and Central Asia created a NWFZ in 2006. Alongside NWFZs, in 1968, the Treaty on the Nonproliferation of Nuclear Weapons (NPT) was created. Many countries eventually signed the treaty, therefore enforcing a large step to reduce nuclear proliferation.

In 1972, the Strategic Arms Limitation Treaty (SALT I) was signed by the U.S. and Soviet Union, restricting their nuclear arsenals. SALT II, a second treaty, was signed by them in 1979, further reducing their nuclear arsenals. In the 1970s-80s, a couple countries, Pakistan and India, performed their first nuclear weapon tests. Around a decade later in 1991, the Soviet Union fell, creating Russia and multiple other countries such as Ukraine. All of the nuclear weapons in these countries were given to Russia so they could

be disposed of. A few years later, the Comprehensive Nuclear Test Ban was opened for signatures in 1996, but never went into effect.

In 1997, the Model Additional Protocol was added to IAEA procedure. The new protocol was added in response to discovering Iraq tried to pursue an unauthorized nuclear program despite being under IAEA inspections. While the new protocol is voluntary, it's used in many different countries to allow IAEA more access to nuclear sites and information, therefore allowing them to ensure nuclear safety and transparency.

Many countries participated in the NPT, yet in 2003, North Korea withdrew from the treaty months after the IAEA found that officials had been producing enriched uranium, an ingredient in nuclear weapons. After leaving the treaty, North Korea eventually completed a nuclear weapon test years later. Despite efforts to reach agreements with North Korea about their nuclear program, no large resolutions have been reached, making North Korea one of the most unstable nuclear powers in the world.

Additionally, in 2002 a heavy water plant and uranium enrichment plant were found in Iran, leading to distrust in Iranian-U.S. relations. In July, 2015, An

agreement surrounding this tension was reached between the U.S., China, France, Germany, the UK, Russia, the European Union, and Iran. The agreement was called the Joint Comprehensive Plan of Action (JCPOA). The JCPOA required Iran to reduce its nuclear program and allow IAEA inspections in exchange for fewer and less expensive sanctions on its economy from the U.S. Although this agreement lasted for a few years, Donald Trump removed the U.S. from it in 2018, leading to sanctions being raised back to normal levels.

More recently, Russia invaded Ukraine in 2022. With Russia's immense possession of nuclear weapons and determination to defend its territory, the war is related in many ways to the topic of nuclear proliferation.

The Current State of Nuclear Proliferation:

Countless events of the past have shaped and created the state of nuclear proliferation in present times. This includes the possession of nuclear weapons and the status of treaties, including countries that have signed certain treaties.

Firstly, over 12,100 nuclear warheads are estimated to be in the possession of around nine countries. Most of these weapons, around 90%, are owned

by the U.S. or Russia with around 5,748 weapons belonging to the U.S. and about 5,580 weapons belonging to Russia. Other countries with weapons include China, France, the UK, India, Pakistan, Israel, and North Korea. An estimated amount of nuclear weapons belong to each country as China has around 500, France has around 290, the UK has around 225, India has around 172, Pakistan around 170, Israel around 90, and North Korea with about 50.

Furthermore, the NPT treaty has not been signed by India, Pakistan, or Israel despite them having nuclear weapons. North Korea had also left the treaty in 2003, yet it also possesses nuclear weapons.

The Russia-Ukraine conflict is still happening today, a few years after the original invasion. A large difference between Russia and Ukraine is that Russia has thousands of nuclear weapons, making it one of the largest nuclear powers in the world, while Ukraine has zero. The U.S. on the other hand also has thousands of nuclear weapons like Russia, making it another one of the major nuclear powers in the world. The U.S. has provided Ukraine with support throughout the war, so they are indirectly opposing Russia, creating a slight tension between the two countries, also the two largest nuclear powers.

Throughout the Russia-Ukraine war, Russia has made threats of nuclear weapons use indirectly. This has caused some uneasiness as nuclear weapons cause massive destruction. Even today, the slight threats and conflict shows the fear and threats of nuclear weapons and proliferation present.

Solutions Proposed in The Past and Solutions in Effect Today:

Firstly, the IAEA was created in July 1957 to help prevent nuclear proliferation and to encourage peaceful uses of nuclear power such as for energy production. The IAEA was and is very successful because it regulates how countries are using nuclear technology, therefore providing more security. In addition, the IAEA has not stayed the same over time. It has changed in many ways including adopting new policies and procedures. Some of these new elements include the Comprehensive Safeguards Agreement(CSA) and the Model Additional Protocol. The CSA allows the IAEA the right to place safeguards on any and all nuclear materials belonging to a country to prevent the misuse of those materials or weapons for unwanted purposes. Additionally, a CSA is required in the NPT for each country that signs it.

Currently, 182/186 countries that are non-nuclear-weapon states have CSAs.

In addition to CSAs, Model Additional Protocol was added to the procedure of IAEA. While Model Additional Protocol is not required, it has been implemented in 127 countries. It allows IAEA more access to nuclear sites and information in those 127 countries.

NWFZs (Nuclear Weapon Free Zones) are areas where nuclear weapons and materials are not allowed. The first countries to establish a NWFZ were the Latin American countries. With the Treaty of Tlatelolco in 1957, a NWFZ was established in Latin America. From that point on, many other countries and areas followed that example, as the South Pacific countries, Southeast Asian countries, African countries, and Central Asian countries have established NWFZs. In addition to NWFZs in countries, they are implemented in certain areas like outer space and the ocean floor.

Moreover, there were many treaties and agreements made to ensure the security of nuclear technology and prevent nuclear proliferation. One of the most well known treaties is the NPT (Treaty on the Nonproliferation of Nuclear Weapons). It was created in June, 1968, and has been in effect since then. The NPT encourages the

peaceful use of nuclear weapons, but tries to prevent nuclear proliferation and use of nuclear weapons in harmful ways.

Countries without existing nuclear weapons who sign the NPT agree to not produce or use nuclear weapons. Furthermore, countries who sign the NPT and possess nuclear weapons must not try to influence or assist a non-nuclear-weapon state to violate the treaty in any way. In the present, 191 countries have signed the NPT, including five nuclear-weapon states.

Another set of agreements were SALT I and SALT II. In 1972, SALT I (the Strategic Arms Limitation Treaty) was put into effect. It required that the U.S. and Soviet Union reduce their nuclear arsenals. In 1979, SALT II was signed, further reducing their arsenals.

The Treaty on the Prohibition of Nuclear Weapons (TPNW) was opened for signatures in 2017, and put into force in 2021. It was signed by 94 countries, therefore requiring that those countries refrain from participating in any nuclear proliferation or related activities. They also have to help rebuild and assist individuals, and the environment, affected by nuclear weapons and testing.

The JCPOA (Joint Comprehensive Plan of Action), now known as the Iran Nuclear Deal, was signed in 2015, allowing

the IAEA most access to Iran's nuclear facilities. Iran also agreed to get rid of much of its nuclear program. Both of these changes were in exchange for large sanction reliefs on Iran's economy. The deal lasted for a few years, but in 2018 Trump had the U.S. leave the agreement. Since then, the deal hasn't been as effective since the U.S. left because Iran has started to obtain and create nuclear materials again.

Finally, there is a treaty that never went into effect, it was only signed. This was called the Comprehensive Nuclear Test Ban Treaty (CTBT). It bans any and all nuclear explosions. Although 187 countries signed this treaty, it still has not gone into effect, even after 29 years since it opened for signatures in 1996.

Analysis:

Nuclear proliferation has been affected by many factors and is a large issue itself in the world today. In the 1930s, nuclear technology was first created, leading to the Manhattan project. This project created the first nuclear bombs, leading to massive destruction as these bombs were then dropped on Hiroshima and Nagasaki. The bombings caused concern, as nuclear technology and weapons were a new discovery and idea. The damage and lives lost from nuclear weapons in this instance

also highlights the dangers of nuclear weapons if they are used in the wrong way.

More events also occurred in the future, including the Kyshtym disaster in Russia and the Cuban missile crisis. The Kyshtym disaster specifically showcases the negative effects and dangers nuclear weapons present to those possessing them. In addition to that, the Cuban missile crisis displays the panic and unrest threats of nuclear war cause.

Furthermore, IAEA was created in 1957 to prevent nuclear proliferation and encourage the peaceful use of nuclear technology. Many agreements and treaties were signed throughout the years after this, all aiming to prevent nuclear proliferation and prevent harmful uses of the weapons. One of the largest and first treaties was the NPT which had a large impact on nuclear proliferation as it was signed by many, many countries.

Although efforts made in the past have reduced nuclear proliferation and established important guidelines, nuclear proliferation remains a large threat today. Nine countries possess nuclear weapons and over 90% belong to the U.S. and Russia. With the Russia-Ukraine conflict still on-going in today's times, Russia's subtle threats of nuclear power, and nuclear weapons being present in multiple countries,

nuclear proliferation remains a large concern in the IAEA.

Questions to Consider:

- 1. In what ways can nuclear proliferation negatively affect people and countries?**
- 2. What are some of the large problems that nuclear proliferation creates?**
- 3. How did the creation of nuclear weapons and the start of nuclear proliferation impact the world?**
- 4. What elements of solutions in the past helped prevent nuclear proliferation?**
- 5. How does the fact that two countries possess 90% of nuclear weapons in the world affect nuclear proliferation?**

Topic 2: The Sustainability of Nuclear Energy

Introduction:

Nuclear energy is the most widely used renewable source of energy. It's produced mainly by nuclear fission, where

the nuclei of atoms split apart. Nuclear power plants and reactors typically use uranium, a naturally occurring radioactive element, to produce heat which activates a generator.

History:

In the 1930s, scientists were making discoveries which led to the creation of the well-known atomic bomb. For example, Lise Meitner, Otto Hahn, and Fritz Strassman discovered nuclear fission in 1938. This made way for even more discoveries, such as Enrico Fermi and his team creating the world's first nuclear reactor in 1942. Most of these technological advancements happened under the Manhattan Program during World War II.

Another contribution to nuclear technology was the Advisory Committee on Uranium was a committee created by President Franklin Roosevelt in 1939, with the purpose of recommending funding and evaluating research, as well as combining the U.S Government and scientific community as part of a war effort. The establishment of this committee made way for the groundwork of the Manhattan Project.

The Manhattan Project:

The Manhattan Project was a top-secret program during World War II with the goal to create nuclear weapons before the Nazi Germans did. It was led by the United States, and Canada and the United Kingdom were involved. The project was directed by Major General Leslie Groves, an Army Corps of Engineers officer. It had three main sites in the United States, which were Hanford, Washington which was the producer of enriched Plutonium, Oak Ridge, Tennessee which had a massive complex to enrich Uranium which eventually became the headquarters of the entire project, and Los Alamos, New Mexico where the laboratory was located and the first test was conducted.

At the peak of the Manhattan Project, approximately 130,000 people were employed in the program, and some notable people were J. Robert Oppenheimer, who was the director of the Los Alamos Laboratory, and also Enrico Fermi. The project cost about \$2 billion, which would be about \$30 billion now. Most of this money was spent on creating, operating, and maintaining the power plants which produced the material needed to create the fuel for the bombs.

The Trinity Test

On July 16, 1945, the United States Army conducted the first ever detonation of a nuclear weapon in the White Sands Proving Ground, located in the desert of Southern New Mexico. Trinity was the codename for this test, which was successful.

In the years to come, people in the nearby counties started experiencing health issues. For example, diseases such as cancer and leukemia were being reported in people who had no prior history of them.

However, the Trinity Test made a large impact, proving that atomic technology could be used to make weapons, and that the United States had this power. The United States could now create more atomic bombs, giving them an advantage in the war. This test also made way for the use of the bombs on Hiroshima and Nagasaki, and was the start of the Atomic Age.

The Bombing of Hiroshima and Nagasaki

Germany surrendered in May, 1945 and was therefore out of the war. The focus of the Allied forces was now shifted to the Pacific war. By then, the Allies had two types of atomic bombs: The 'Little Boy,' an enriched Uranium gun-type weapon, and the 'Fat Man,' a Plutonium implosion-type weapon. The Allies had consent to use these

weapons on Japan when the Japanese government ignored the threat of "prompt and utter destruction"

On August 6, 1945, a 'Little Boy' bomb was dropped over Hiroshima by a bomber plane piloted by United States Army Air Force Colonel Paul Tibbets Jr. Three days later, when the Japanese still did not surrender a 'Fat Man' bomb was dropped over Nagasaki, which forced them to surrender, as many civilians were dead in the immediate aftermath of the bombing, although many also started slowly dying from burns, radiation sickness, and injury.

This bombing immediately ended World War II, and the effects were devastating. This was the first and only time that a country used an atomic weapon.

The Hibakusha and Their Contribution

Hibakusha is the name given to survivors of the Hiroshima-Nagasaki bombings, who have suffered from radiation sickness, loss, and even discrimination.

For decades since the bombings, the Hibakusha strongly advocated for nuclear disarmament and peace by sharing their own experiences with leaders, at conferences, and in the media; their testimonies showed the world how unacceptable and damaging nuclear weapons are.

Nihon Hidankyo and the UN

Nihon Hidankyo is an organization of atomic bombing survivors who represent the Hibakusha founded in 1956. This group has worked with the United Nations in many different settings to advocate for nuclear disarmament.

For example, in 1978 and 1982, representatives of Nihon Hidankyo participated in the UN Special Sessions on Disarmament in New York. The purpose of this meeting was to encourage collaboration towards nuclear disarmament, and also to establish strategies for global arms control.

In 2017, the Treaty on the Prohibition of Nuclear Weapons was adopted to ban nuclear weapons after the United Nations held a conference to negotiate it.

The Shift and Rise of Nuclear Technology

After World War II, scientists started working on using nuclear technology to produce energy, after realizing that a controlled nuclear reaction could release a sufficient amount of power. For example, Enrico Fermi directed comprehensive research on bombarding elements with neutrons, which eventually led to further understanding of nuclear fission.

In 1951, the Experimental Breeder Reactor I in Idaho became the world's first

power plant to produce electricity using nuclear technology.

A big milestone for nuclear energy was the Shippingport Atomic Power Station of the Department of Energy and the Duquesne Light Company. The power plants are located near Pittsburgh Pennsylvania and became the world's first nuclear-powered commercial power plant.

This power plant was an important landmark because before the rise of peaceful nuclear technology, people mainly associated it with weapons and warfare. However, the successful technology in this power plant proved that nuclear energy could not only be harnessed in a safe way, but also efficiently, as the plant used a pressurized water reactor, which was known for its stability and safety features.

The Shippingport power plant also proved that nuclear energy is a cleaner, more sustainable alternative energy source as opposed to coal, oil, and natural gas, all of which were extremely common in the 1950s.

The Kyshtym Disaster

Being a fairly new technology, nuclear energy did have some drawbacks and major events, one of which being the 1957 Kyshtym Disaster at the Mayak facility, a Soviet power plant near Kyshtym.

This incident is regarded as the second-worst nuclear disaster, after the well-known Chernobyl reactor explosion.

The Mayak facility was a nuclear power plant, used to produce plutonium and weapons for the Soviet Union's program. The radioactive waste was stored underground in steel tanks, which were cooled so that the material wouldn't overheat. However, one of the cooling systems in the tanks failed, leading to a buildup of heat and pressure inside the tank, causing it to explode. This released radioactive dust onto the people and buildings nearby, although people didn't notice it immediately.

Many people were exposed to high radiation before evacuating, (about a week after the incident,) and eventually there were many reported cases of radiation sickness, cancer, and birth defects.

Today, this region is still one of the most contaminated places on earth. The Soviet Union kept this accident secret for many decades, so global changes to nuclear waste management were not made quickly.

However, the Soviet authorities made some changes, such as the establishment of a research station in the East Urals Radioactive Trace, which was the world's first outdoor radio-ecology laboratory. This station was used to research

ways to clean radioactive soil and grow safe food in the contaminated region.

Impact on the Evolution of Nuclear Energy

The Soviet authorities were secretive about the Kyshtym incident, which was why alarms were raised and new guidelines and regulations were created globally when it was revealed in the 1970s.

This disaster, along with others such as the Three Mile Island, Fukushima, and the well-known Chernobyl, resulted in many improvements being made in the nuclear energy field, such as waste management and reactor safety.

In 1958, American scientist Charles Keeling conducted measurements of CO₂ levels in the atmosphere, and by analyzing the samples, was able to prove that the levels were rising because of human activities, specifically burning fossil fuels.

His research led to agreements and environmental policies, such as the ratification of the United Nations Framework Convention on Climate Change in 1992, the objective of which was to stabilize greenhouse gas levels.

By this time, researchers and governments started prioritizing sustainable energy sources, specifically nuclear power as it produces almost no carbon. Therefore,

even more nuclear advancements were made; for example, the first of the third-generation reactors were built, which focused on efficiency and minimising risks.

Sustainability:

Sustainability, in terms of human civilization, is the ability to meet present day needs without compromising the ability to meet those of the future generations. Nuclear energy is considered a sustainable source of energy because it's efficient. However, the material needed to produce it is a finite source.

Although nuclear energy is cleaner than the fossil fuels we use, as it has a lower carbon footprint, uses less land, and requires less materials, it does have some negative effects on the environment and health. For example, people working at nuclear plants can develop cancer or cardiovascular diseases, and additionally, disposing of nuclear waste is challenging, as the safest way to do it is by burying it deep in the earth's crust.

Questions to Consider:

- 1. How did Charles Keeling's discovery of the link between carbon emissions and fossil fuels impact the advancement of nuclear energy?**
- 2. What factors make nuclear energy a renewable or non-renewable source?**
- 3. Does the environmental damage caused by uranium mining and processing outweigh the benefits of nuclear energy such as low carbon emissions?**
- 4. Should nuclear energy be the main source of energy over other renewable sources, or should it be a temporary solution while other renewable technologies (solar power, hydroelectric power) improve?**

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