

# 4th SPD

*Advanced  
GA*



**TOPICS:** Rare Mineral Trade, Nuclear Energy  
in Unstable and Developing Regions

**CHAIRS:** Whitney Marsh, Jack Mondello

LAIMUN XXIX

*December 2-3*

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## Letter from the Secretaries-General

Dear Delegates,

On behalf of our entire staff, it is our pleasure to welcome you to Session XXIX of the Los Angeles Invitational Model United Nations (LAIMUN) conference. LAIMUN XXIX will take place on Saturday, December 2 and Sunday, December 3 of 2023 at the Mira Costa High School (MCHS) campus.

Our staff, composed of over 120 MCHS students, has been working tirelessly to make your debate experience the best it can be. You will find your dais members to be knowledgeable about the issues being debated and MUN procedure. We pride ourselves in hosting a conference that is educational and engaging, and we hope you take advantage of that as you prepare and debate.

At LAIMUN, we value thorough research and preparation. We ask that delegates write position papers following [these directions](#). The deadline to submit position papers to be considered for Committee and Research Awards is Friday, November 24 at 11:59 PM PT. The deadline to submit to be considered for Committee Awards is Thursday, November 30 at 11:59 PM PT.

We also encourage all delegates to read the [LAIMUN Rules of Procedure](#) for conference-specific information and as a reminder of points and motions that can be made during committee.

Feel free to reach out to our staff with any questions or concerns you may have. Delegates can find their chairs' contact information next to their committee profile and the Secretariat's email addresses on the staff page. Any member of the LAIMUN staff will be happy to assist you.

We look forward to seeing you in December!

Sincerely,

Akash Mishra and Lily Stern  
Secretaries-General, LAIMUN XXIX  
[secretarygeneral@mchsmun.org](mailto:secretarygeneral@mchsmun.org)



## Introduction to the USG

Welcome, Delegates, to LAIMUN XXIX!

My name is Naomi Kim, and I am so excited to conclude my fourth and final year at Mira Costa Model UN by being the Under-Secretaries General of the General Assembly!

Every year, we select the GA committee topics to reflect the diversity of issues present in our rapidly modernizing world, and this year is no exception. I am excited to hear the novel, creative, and detailed solutions each of you have to address these complex problems, and I hope that all of you can leave LAIMUN not just having given an awesome speech and spectacular formal caucus sessions, but with an enriched and diversified outlook.

But in order to have another amazing LAIMUN, I want to remind you all of our strict no pre-written resolutions policy. Under no circumstances is pre-written resolutions acceptable; additionally, delegates are only allowed to work on resolutions during committee sessions, not during breaks. Your chairs will outline this policy in greater detail before the start of debate, and we urge you all to comply.

Our staff have worked incredibly hard to create an informed, professional environment, and we hope that you enjoy it. Come equipped with knowledge, strong solutions, and your sleek WBA, but do not forget—MUN is fun!

If you have any additional questions or concerns, feel free to contact me at the following address: [GA@mchsmun.org](mailto:GA@mchsmun.org). If not, I look forward to seeing you all in December!

Best Regards,

Lily Stern and Akash Mishra  
Secretaries-General

Naomi Kim  
Under-Secretary General

## Introduction to the Dias

Hello delegates!

My name is Whitney Marsh and I will be your co-chair with Jack for 4th SPD Advanced! I'm a senior at Mira Costa and have been a part of the MUN program since freshman year. I have had the amazing opportunity to travel to places like Berkeley, Germany, and Brown University to debate. I have also participated in multiple local conferences. Last year, I was the LAIMUN Chief of Staff and helped organize this wonderful conference. I am a TA for the Intro to MUN Freshman class this year, where I teach them the fundamentals of MUN, debate, and confidence.

Outside of MUN, I have been on the Mira Costa Varsity Dance Team for 4 years. I am currently the Co-Captain of the national winning team and we perform at school events, basketball games, and of course, football games. Additionally, I am on the ComedySportz team at Costa, which means that I love to see funny and lighthearted hooks during committee! I am also a proud member of MCHS Link Crew and National Honors Society. A fun fact about me is that my 3 favorite artists of all time are Harry Styles, Taylor Swift, and Hozier. In my free time, I love to hang out with my friends, go to the beach, and order chicken tenders off the kid's menu.

In 4th SPD, we hope to focus on delving into a wide array of solutions and fostering debates on topics that hold relevance for every nation in the international arena. We hope to see quality solutions and no boring moments in debate!! We encourage you to reach out to us at [spd.adv.laimun.xxix@gmail.com](mailto:spd.adv.laimun.xxix@gmail.com) for any inquiries or concerns. We are so excited to meet every single one of you and can not wait to see the creative solutions you come up with. Have fun!

♥, Whitney Marsh

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Hello Delegates!

My name is Jack Mondello and I will be your co-chair along with Whitney for 4th SPD Advanced! I am currently a junior at Mira Costa and I have been a part of the Model UN program since my freshman year. Over the past years in the program, I have participated in a number of both local and travel conferences including NHSMUN and BruinMUN. I have made countless memories in the MUN program and have thoroughly enjoyed having the chance to debate on such pressing international affairs since I joined MUN. Additionally, I was a legal at LAIMUN last year and I am excited to have the opportunity to chair 4th SPD this year.

Outside of MUN, I am on the basketball team here at Costa and volunteer for Project Soile, which has the goal of teaching English to students in Kazakhstan and Eastern Asian nations. I've been playing basketball since I was 5 years old and it has been one of my biggest passions since. I love being a part of the basketball team at Costa and getting to play with my friends everyday. Outside of school and sports, I enjoy spending time with friends, going to the beach, and playing video games.

In 4th SPD, I would like to see a variety of solutions which cover multiple different subtopics. As chairs, we did our best to choose topics which have a wide range of possible solutions and are applicable to each nation in the committee. If you have any questions, please feel free to reach out to us at [spd.adv.laimun.xxix@gmail.com](mailto:spd.adv.laimun.xxix@gmail.com). With this in mind, I am beyond excited to chair this committee and cannot wait to see all of you at LAIMUN!

Sincerely -- Jack Mondello

## Committee Description

The United Nations General Assembly's Fourth Committee, (also known as the Special Political and Decolonization Committee, SPECPOL, or 4th SPD) is one of the six principal committees of the UN General Assembly. SPECPOL includes every UN member nation. Created in 1949, the Fourth Committee was originally mandated to be responsible for decolonization related issues. The Fourth Committee was combined with the Special Political Committee, the seventh principal committee, in 1993 to form the Special Political and Decolonization Committee.<sup>1</sup>

Currently, the main focus of the 4th SPD is to address a wide array of political issues. Specifically, it addresses decolonization, political refugees, especially Palestinian refugees with the United Nations Relief and Works Agency for Palestinian Refugees in the Near East (UNRWA), and political conflicts, such as the Report of the Special Committee on Israeli Practices.<sup>2</sup> SPD also deals with issues such as the conflict-free uses of space and mine action. This committee additionally reviews the articles regarding the University of Peace triennially and biennially.

The purpose of this committee is to create resolutions that ensure a country's national sovereignty is respected and upheld. Delegates in this committee are able to suggest the creation of subsidiary bodies to review issues that do not fall under the mandates of other General

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<sup>1</sup> [https://www.un.org/ga/search/view\\_doc.asp?symbol=A/RES/47/233](https://www.un.org/ga/search/view_doc.asp?symbol=A/RES/47/233)

<sup>2</sup> <https://www.un.org/en/ga/fourth/>

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Assembly committees. Debate should reflect the objectives of the Fourth Special Political and Decolonization committee and the expectation of supporting countries' territorial jurisdiction.



## Topic A: Rare Mineral Trade

### I. Background

Rare earth minerals are a group of 17 elements and they play a large role in multiple industries, but primarily the technology industry. These elements have three key properties which make them so unique. These are fluorescent, magnetic, and conductive properties. Due to these properties, rare earth minerals often give off light when in contact with electromagnetic radiation<sup>3</sup>. This ability makes rare earth metals extremely valuable in the tech industry and makes them necessary components in devices such as smartphones, cameras, computers, televisions, and light-emitting-diode lights.

The mining and extracting of rare earth minerals has had detrimental effects on the environment, economy, and society. Most commonly, rare earth minerals are mined using open pit methods. These pits are mined and after extracting the minerals, the liquid-liquid extraction process is used. This process involves separating compounds based on their solubilities in two different kinds of liquids. These two liquids are immiscible, meaning that they are incapable of forming a homogeneous mixture when combined. This allows for the elements of a given compound to dissolve into their respective liquids and then be separated. Once separated, the useful minerals are taken and the other elements in the compound are disposed of or repurposed.

This mining process has caused extreme harm to the environment. The mines used are known to release toxic chemicals into the atmosphere and soil which has negatively impacted air

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<sup>3</sup> “Science of Rare Earth Elements.” *Science History Institute*, 10 May 2023, sciencehistory.org

and soil quality surrounding the mines. Additionally, these mining processes have directly impacted ocean life through ocean acidification. The chemicals released during the mining of rare earth minerals contaminates groundwater which later enters the ocean and causes the pH to decrease. In recent years, the pH of the ocean has lowered by 0.1, which is roughly 30% more acidic<sup>4</sup>. This decrease especially affects coral reefs and shelled creatures in the ocean as it causes lower calcium levels in the water, which is necessary for these organisms to form and maintain their shells. This initiates a ripple effect on all other ocean creatures. Smaller organisms lose their habitats and begin to die off, the ocean becomes more polluted from a lack of filtration from shelled species, and the predator-prey balance is thrown off as smaller creatures of prey are no longer able to protect themselves and find refuge in coral reefs.

Rare earth mineral mining has additionally had an impact on social and economic factors. Primarily, in China there has been highly increased human health risks as a result of these mining sites. Currently, China dominates the rare earth mineral business with 98 percent of rare earth minerals imported into the European Union coming from China<sup>5</sup>. Mining sites in China have led to many people local to these locations being displaced and workers at these sites have been put in danger. Mine operators are exposed to the hazardous chemicals which are released from the process and this causes respiratory illness and radiation exposure which can both lead to other

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<sup>4</sup> “Ocean Acidification.” *National Oceanic and Atmospheric Administration*, [www.noaa.gov](http://www.noaa.gov)

<sup>5</sup> Armstrong, Martin, and Felix Richter. “Infographic: China Dominates the Rare Earth Market.” *Statista Infographics*, 13 Jan. 2023, [www.statista.com](http://www.statista.com)

health issues. Extracting one ton of rare earth minerals results in about 2,000 tons of toxic waste<sup>6</sup>. In China this has had devastating effects and has left entire regions displaced. Additionally, while in use mines are often sprayed with acid in order to separate the rare earth minerals from the other elements. This means that these lands are no longer able to be used for agriculture and are permanently contaminated. Furthermore, only around 10% of China's total land area is used for agriculture and contamination from mining heavily affects the food supply, which is especially detrimental to rural villages that depend on income from agriculture. Some big corporations even still sell contaminated products to gain higher profits, which can cause more health risks for citizens. Overall, the process of mining these rare earths is causing the downfall of the environment, agriculture in China, and destroying the homes of many.

The reliance on China for access to rare earth minerals also poses a variety of threats to all other nations. One of these threats is a loss of economic independence for many smaller nations. Being reliant on China for all of their access to rare earth mineral resources means that when a supply chain disruption or market fluctuation occurs, smaller countries are put in a very vulnerable position. China has been able to seize and maintain control over the trade of these rare earths and it is growing to be very problematic. They did this by heavily investing in the mining industry. In 2019, China invested 14.1 billion dollars in geological exploration and 173 billion dollars in mining activities<sup>7</sup>. This can also cause heightened tensions between other nations for control over borders that contain these rare resources. For example, many nations have been

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<sup>6</sup> Penke, Michel. "The Toxic Damage from Mining Rare Elements – DW – 04/13/2021." *Dw.Com*, 1 Feb. 2023, [www.dw.com](http://www.dw.com)

<sup>7</sup> *2019 Minerals Yearbook - USGS Publications Warehouse*, [pubs.usgs.gov](https://pubs.usgs.gov)

fighting for control over the South China Sea due to its abundance of natural resources. The lack of regulations in China allows for them to mine these resources cheaply and in great quantities, disregarding the negative effects it imposes on the environment and society.

## **II. United Nations Involvement**

The United Nations (UN) has taken action to help ensure the environmental and physical safety of mines as well as to protect and distribute rare earth minerals through resolutions and sustainable development goals. This includes sustainable development goals 7, 8, 9, and 12 which promote economic growth, ensure access to modern technology, and build infrastructure. The UN has established the United Nations Environment Programme (UNEP) whose goal is to create a more stable and healthy environment. For the past 50 years, they have been working with many nations to prevent environmental challenges and implement resource-efficient economies. They work with 139 Member states to primarily maintain sustainable development goals 7, 8, and 9. For instance, they have many projects in place towards pollution management and clean energy solutions. They have a global alliance towards constructing sustainable energy and funding energy sources other than mining. While promoting low-emission economies, they also teach about sustainable science and refocus technology outsourcing. For example, they partnered with the Danish Technical University and Danish Government in 2013 to establish the Sustainable Energy for All Initiative. The department of management engineering at the Danish Technical University has a team consisting of 50 scientists and economists who work to increase sustainable energy access<sup>8</sup>. This initiative is responsible for many influential projects, including

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<sup>8</sup> *UN Secretary-General Appoints Inger Andersen of Denmark as ... - UNEP*, [www.unep.org](http://www.unep.org)

the Renewable Energy Management Initiative (REMI). REMI helps countries improve energy security and economic growth while mobilizing energy resources. Although effective in raising awareness towards the usage of renewable energy sources, REMI had limited success due to a multitude of factors including lack of resources and infrastructure.

### **III. Topics to Consider:**

#### **A. Environmental Degradation**

Rare earth minerals are essential to the planet and new technological advancements but they also cause detrimental consequences to the environment. Rare earth minerals are typically mined in large open pits, but can also be found underground. All rare earth mineral (REE) mines release toxic and radioactive materials into the atmosphere and the ground. The toxic chemicals include sulfuric acid, hydrochloric acid, and ammonium hydroxide. The radioactive elements released are thorium and uranium<sup>9</sup>. All of which can be extremely harmful if consumed or even touched.

Phosphorus and nitrogen are also contaminants found in rare earth mineral mining. Phosphorus and nitrogen are elements known to seep into and contaminate groundwater and other sources of water nearby wherever they are released. These elements are the leading cause of eutrophication in both saltwater and freshwater systems. Eutrophication is the decrease in PH level and increase of nutrients in a body of water. Eutrophication leads to mass killings of sealife,

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<sup>9</sup>“An Updated Review of Toxicity Effect of the Rare Earth Elements (REEs) on Aquatic Organisms”  
<https://www.ncbi.nlm.nih.gov/pmcTrade/articles/PMC7552131/>

leading to dead zones. Because of the increase in mining since rare earth minerals were discovered, eutrophication levels have spiked.

China, in particular, has more than 1,500 active mining projects, as of 2022<sup>10</sup>. This has caused China to experience extremely high levels of groundwater and soil contamination. Harmful chemicals from these REE mines are affecting farms, drinking water, and life in general in China. According to the Los Angeles Times, “In mineral-rich regions of China, poisoned water and soil have caused abnormal disease rates...[and]crops and animals have died around a crusty lake of radioactive black sludge formed from mining waste near a major mining site in Baotou, Inner Mongolia.<sup>11</sup>” Farmers in China that live near REE mines have suffered numerous consequences from the dispersal of harmful chemicals into their environment. These include loss of income and a safe place to live. Living near the mines also introduces people to noise pollution, which can cause permanent hearing loss, and a constant flow of dust and chemical particulates around and inside their houses.

Lastly, rare earth mineral mines have a huge impact on animals. Roads and different types of infrastructure, that are meant to support mines, leave habitats ruined and also produce habitat fragmentation<sup>12</sup>. Habitat fragmentation decreases biodiversity and increases animal deaths. New roads also inhibit migratory routes for animals and cause deforestation. The

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<sup>10</sup>“Mining Market in China.” *Commissioner*,  
<https://www.tradecommissioner.gc.ca/china-chine/market-reports-etudes-de-marches/0006764.aspx?lang=eng>

<sup>11</sup>“The Hidden Cost of China’s Rare Earth Trade” *LA Times*,  
<https://www.latimes.com/world-nation/story/2019-07-28/china-rare-earth-tech-pollution-supply-chain-trade>

<sup>12</sup>“Latest on the Decriminalization of Drugs: Pros and Cons.” *Turning Point of Tampa*, 22 Mar. 2021,  
<https://www.tpoftampa.com/latest-on-the-decriminalization-of-drugs/>.

building of mines calls for the clearing of forestry. Trees are home to many species and the loss of them is detrimental to many habitats around the world.

## **B. Supply Chain Security**

The topic of supply chain security in the rare earth mineral trade has been debated for years between the federal government and the countries involved. Earth contains a large number of rare earth minerals but locating them in sufficient quantities is extremely difficult. This is because it is so hard to find the initial funding needed to construct a mine in an area that can withstand the significant environmental effects of rare-earth processing. Fortunately for China, they have this funding and low regulations surrounding environmental effects.

China has complete control of the rare earth mineral market. Their monopolistic dominance over the world's supply chains for rare earth minerals is problematic. China has utilized its power to assert complete control over other countries that also participate in the trade. China has also continuously coerced other countries into trade when they were resistant and China took advantage of their power and has used it as leverage in the political world. One example of this is when China threatened to restrict rare earth mineral shipments to US defense firms in response to US arms sales to Taiwan<sup>13</sup>.

China has defended its power in the REE industry for years, eliminating rivals and making efforts to stop supply chains from changing. The security of the rare earth mineral trade

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<sup>13</sup>“The Challenge of Supply Chain Resilience: The Case of Rare Earth Minerals” *John Coyne*, <https://sldinfo.com/2022/08/the-challenge-of-supply-chain-resilience-the-case-of-rare-earth-minerals/>

is non-existent, in that China runs everything. It is crucial that countries start taking the initiative in combating China's harmful efforts to control the entire trade market.

### **C. Chinese and Russian control over Africa**

The control of rare earth minerals and trade by China and Russia in Africa is a significant issue that warrants exploration. China has been actively involved in securing rare earth minerals in Africa, which are crucial for various industries, including technology and renewable energy. Chinese companies have invested heavily in African mines and processing facilities. This has given them a significant advantage in the global rare earth mineral market, which is very competitive. This dominance allows China to exert control over the supply chain and influence global trade patterns. While China is a prominent player in the rare earth market, Russian companies have been involved in mining and processing rare earth minerals in Africa, contributing to their control over this critical sector. The Russian presence adds another layer of complexity to the global trade dynamics of rare earth minerals. The control exerted by China and Russia over rare earth minerals in Africa has both advantages and disadvantages for the continent. It brings investment and economic opportunities, providing much-needed infrastructure development and job creation, but it also raises concerns about resource exploitation, environmental sustainability, and the long-term economic benefits for African nations.

The dominance of China and Russia in the rare earth mineral sector has significant implications for global trade. Their control over the supply chain gives them leverage in negotiations and the ability to influence prices. This can impact industries worldwide that rely on



these minerals, potentially leading to supply disruptions and increased costs. The control of rare earth minerals and trade by China and Russia in Africa has far-reaching implications. While it brings economic opportunities for African nations, it also raises concerns about resource exploitation and global trade dynamics.

#### **IV. Case Study: Senkaku and Diaoyu Islands Dispute**

In 2010, the Chinese government prohibited the shipment of rare earth minerals to Japan. Chinese customs officers stopped rare earth minerals exports to Japan and forbade their loading onto ships at ports. In a dispute over the control of the Senkaku and Diaoyu Islands, China made the ultimate decision to use its power to hurt another country. Japan's electronics market is significantly reliant on China because of its access to the majority of the rare earth mineral supply in the world. China wanted to put economic pressure on Japan and demonstrate its supremacy in the world market for rare earth minerals by stopping the export of rare earth materials to Japan. According to the New York Times, “By stopping the shipments, they’re disrupting commercial contracts, which is regrettable and will only emphasize the need for geographic diversity of supply,” said Dudley Kingsnorth, the executive director of the Industrial Minerals Company.

Additionally, the Chinese government gave orders to prohibit all rare earth resource exports to Japan, which affected Japan’s industry tremendously, leaving them with decreased profit and income for the few years to come. Japan was the primary consumer of Chinese rare earth minerals. They employed them in a variety of industrial processes, including the production of glass for solar panels. They were also utilized for motors in cars with normal gasoline engines

as well as hybrid vehicles, in Japan. Japan needed imports from China in order to supply their nation with cars and other things, such as electronics and LED lighting<sup>14</sup>.

The negative effects on Japan because of China's actions also trickled down to other countries. Since the United States production in rare earth minerals shuttered around 2010, American industries relied primarily on Japan for magnets<sup>15</sup> and other components requiring rare earth elements. The United States also used these minerals for iPhones and electronics, which were becoming very popular and in high demand. The Chinese export ban immediately impacted many states in the USA, including Washington and California<sup>16</sup>. This incident highlighted the importance of diversifying the sources of rare earth minerals and reducing dependence on any one country for these critical resources. It also showed just how corrupt and unstable the rare earth mineral trade is, because it is primarily run by China.

## V. Questions to Consider

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<sup>14</sup>“Japan loosens China's Grip on Rare Earths Supplies”,  
<https://www.reuters.com/article/us-japan-rareearths/japan-loosens-chinas-grip-on-rare-earths-supplies-idUSKBN0H001T20140905>

<sup>15</sup>“*Amid Tension, China Blocks Vital Exports to Japan*” Keith Bradsher,  
<https://www.nytimes.com/2010/09/23/business/global/23rare.html>

<sup>16</sup>“U.S. extends three firms' export ban over China exports” David Shepardson, Karen Freifeld,  
<https://www.reuters.com/business/us-extends-three-firms-export-ban-over-china-exports-2022-12-08/>

1. What steps can be taken to ensure a more equitable distribution of rare earth minerals among countries, and how can the global community work together to reduce dependence on any one country for these critical resources?
2. How can the environmental impacts of rare earth mineral mining and refining be reduced, and what role can regulations and international agreements play in achieving this goal?
3. How can technology and innovation be leveraged to improve the efficiency of rare earth mineral extraction and processing?
4. What role can international cooperation and diplomacy play in achieving a more secure trade industry for rare earth minerals?
5. How can the reuse and recycling of rare earth minerals be implemented to decrease the reliance on mining to obtain these resources?
6. How can technology be adapted to be less reliant on rare earth minerals for production and functionality?

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## Topic B: Nuclear Energy in Unstable and Developing Regions

### I. Background

The topic of nuclear energy and its use has been heavily debated in recent history. The enormous potential of nuclear energy as a source of power has been enticing to many nations, including those in unstable and developing regions as it is generally stable, reliable, and low-cost. Developing nations, especially, have increasingly demanding energy needs, and energy consumption in developing nations is projected to increase by 3% per year<sup>17</sup>. Additionally, many developing nations have high amounts of uranium, which gives them further reason to increase their usage of nuclear energy sources.

The use of nuclear energy in unstable and developing regions has had catastrophic effects on the governments, environments, and people of these nations. One of the primary downsides of nuclear energy use in developing regions is the high initial cost. Building and maintaining a nuclear power plant requires very high investments of both time and money. It costs between six and nine billion dollars to build a 1,100-megawatt plant, which provides energy for homes around the world<sup>18</sup>. For many developing nations, this is a barrier to using nuclear energy and

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<sup>17</sup> “What Drives Energy Consumption in Developing Countries? The Experience of Selected African Countries.” *Energy Policy*, 21 Jan. 2016, [www.sciencedirect.com/science/article/abs/pii/S0301421516300118#:~:text=Energy%20consumption%20in%20developing%20countries%20is%20projected%20to%20grow%20at,grow%20at%200.9%25%20per%20year](http://www.sciencedirect.com/science/article/abs/pii/S0301421516300118#:~:text=Energy%20consumption%20in%20developing%20countries%20is%20projected%20to%20grow%20at,grow%20at%200.9%25%20per%20year).

<sup>18</sup> *Nuclear Power Plant Construction Costs - July 2008 - Synapse Energy*, [www.synapse-energy.com/sites/default/files/SynapsePaper.2008-07.0.Nuclear-Plant-Construction-Costs.A0022\\_0.pdf](http://www.synapse-energy.com/sites/default/files/SynapsePaper.2008-07.0.Nuclear-Plant-Construction-Costs.A0022_0.pdf). Accessed 23 June 2023.

can often cause financial instability. This also negatively impacts other important sectors due to the fact that funding for these nuclear power plants is commonly taken from the education, healthcare, and transportation sectors.

Another detrimental effect of Nuclear energy use in unstable and developing regions is unsafe working conditions and overall safety concerns. Although nuclear accidents are uncommon, when they occur they have severe effects on the people and environment in surrounding areas. When a nuclear explosion occurs, it has a similar capacity to that of conventional explosive devices. According to the National Academies Press, “The shock wave can directly injure humans by rupturing eardrums or lungs or by hurling people at high speed, but most casualties occur because of collapsing structures and flying debris.”<sup>19</sup> In addition, nuclear explosions emit high levels of thermal and chemical radiation. This radiation can burn the skin, cause respiratory issues, and lead to diseases such as cancer.

Nuclear energy use in developing nations also brings up the issue of radioactive waste and the harmful effects poor nuclear waste management can have on a region. Managing nuclear and radioactive waste is a complex process that requires technical expertise and sufficient funding. Initially, the radioactive waste has to be reduced and the composition of the compounds needs to be changed. This process is elongated and made difficult by the long half-lives of most radioactive isotopes. A “Half-life, in radioactivity, is the interval of time required for one-half of

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<sup>19</sup> “Read ‘Effects of Nuclear Earth-Penetrator and Other Weapons’ at Nap.Edu.” *6 Human and Environmental Effects* | *Effects of Nuclear Earth-Penetrator and Other Weapons* | *The National Academies Press*, [nap.nationalacademies.org/read/11282/chapter/8#:~:text=Nuclear%20explosions%20produce%20air%2Dblast,Thermal%20radiation](http://nap.nationalacademies.org/read/11282/chapter/8#:~:text=Nuclear%20explosions%20produce%20air%2Dblast,Thermal%20radiation). Accessed 22 June 2023.

the atomic nuclei of a radioactive sample to decay.”<sup>20</sup> Essentially, before being disposed of, radioactive waste must decay into non-radioactive elements. This process can take an extremely long time as the half-life of radioactive elements can range from a mere few hours to thousands of years. While waiting for the nuclear waste to decay, it must be stored in special packaging to ensure that the waste will not have adverse effects on the environment or human life. Many developing and unstable regions struggle with this as they lack funding, infrastructure, and personnel to safely store, process, and dispose of nuclear waste.

Nuclear energy use also negatively affects the environment outside of purely nuclear waste. As previously mentioned, developing nations are often attracted to using nuclear energy because of their high reserves of uranium, but the mining and extracting of these resources has caused high carbon emissions and negatively impacted life surrounding the mining sites. Many people are displaced from their homes to create space for the mining sites and the air quality in these areas sees a sharp decrease as a result of the mining. Additionally, there is a threat of radiation hazards for the mine workers in these shafts. Intricate ventilation is needed to prevent the collection of radon gas in the mine shafts, but many developing nations lack the funding for this. Breathing in radon gas can lead to cancer and extreme respiratory issues with prolonged exposure because of radioactive particles that get trapped in people’s lungs. Radon gas is responsible for roughly 21,000 lung cancer deaths per year<sup>21</sup> and is especially dangerous because

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<sup>20</sup> “Half-Life.” *Encyclopædia Britannica*, [www.britannica.com/science/half-life-radioactivity](http://www.britannica.com/science/half-life-radioactivity). Accessed 22 June 2023.

<sup>21</sup>

<https://www.epa.gov/radon/health-risk-radon#:~:text=Radon%20is%20responsible%20for%20about,people%20who%20have%20never%20smoked.>

it is impossible to detect without testing for it. Radon is invisible and odorless which means without machinery and technological equipment, there is no way of knowing when it is present.

Although nuclear energy use does have its downsides, it also has many benefits as well. The first of these benefits is a more reliable and cleaner source of energy. With the introduction of nuclear energy, there will be less reliance on fossil fuels, creating more energy diversity and a cleaner environment. Currently, developing nations use over half of the world's energy, and providing nuclear energy will give these nations a new source of power, and will help reduce the use of non-environmentally friendly energy sources<sup>22</sup>. Furthermore, Nuclear energy will help boost the economies of developing regions. After the initial cost of starting a nuclear power plant, nuclear energy is much more cost effective than conventional energy sources. As well as this, many jobs will be provided as a result and unemployment rates will decrease. This is key as developing nations have an unemployment rate of roughly 5.3% currently and it is expected to increase each year<sup>23</sup>. Overall, it is important to consider both the negative and positive impacts of nuclear energy use in developing nations and work as an international community to implement detailed solutions on the topic.

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<sup>22</sup> CGEP, Columbia |. “Energy and Development in a Changing World: A Framework for the 21st Century - Center on Global Energy Policy at Columbia University Sipa: CGEP.” *Center on Global Energy Policy at Columbia University SIPA | CGEP*, 26 Jan. 2023, [www.energypolicy.columbia.edu/publications/energy-and-development-changing-world-framework-21st-century/#:~:text=Developing%20countries%20currently%20use%20more,consumption%20than%20in%20developed%20countries](http://www.energypolicy.columbia.edu/publications/energy-and-development-changing-world-framework-21st-century/#:~:text=Developing%20countries%20currently%20use%20more,consumption%20than%20in%20developed%20countries)).

<sup>23</sup> *International Standard Classification of Occupations*, [www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms\\_172572.pdf](http://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_172572.pdf). Accessed 23 June 2023.

## II. UN Involvement

The United Nations has been working to support the usage, storage, and disposal of nuclear energy and radioactive waste. Doing this further helps all nations to be more environmentally friendly and support the ecosystem which is in line with many of the sustainable development goals, as well as the Paris agreement. The United Nations founded the committee of the International Atomic Energy Agency (IAEA) is the primary contributor to ensuring safe nuclear energy use. The IAEA was founded on July 29, 1957 with the mission of maximizing the peaceful use of nuclear energy and technology<sup>24</sup>. Since then the IAEA has vigorously worked to increase the safety of nuclear waste disposal, increase nuclear technology to enact more efficient processes, and extend the operating life of nuclear power plants.

Nuclear safety has been a top priority of the United Nations since the Chernobyl plant accident in 1986 and the Fukushima nuclear power plant incident in 2011. In both of these incidents, there were large nuclear explosions which led to mass death, injury, and illness. According to the United Nations, the Fukushima incident resulted in tens of thousands of people needing to be evacuated from their homes<sup>25</sup>. After both of these incidents, the United Nations provided support through medical assistance, radiation detection, and emergency centers. A specific example of this was the Chernobyl Trust Fund created in 1991 by the UN. This fund was used to support research projects related to the incident and provide aid to those affected. As a whole, the United Nations regards the topic of nuclear energy as a very serious matter and

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<sup>24</sup> *The International Atomic Energy Agency* - الأمم المتحدة, [www.un.org/en/conf/npt/2015/pdf/IAEA%20factsheet.pdf](http://www.un.org/en/conf/npt/2015/pdf/IAEA%20factsheet.pdf). Accessed 23 June 2023.

<sup>25</sup> “Atomic Energy.” *United Nations*, [www.un.org/en/global-issues/atomic-energy](http://www.un.org/en/global-issues/atomic-energy). Accessed 22 June 2023.

continuously works to implement solutions on the issue. Despite this, there is more work which needs to be done in order to effectively ensure the safety of nuclear energy worldwide.

### **III. Topics to Consider:**

#### **A. Potential Health and Environmental Impacts**

Nuclear energy is a huge part of developed countries, helping them to increase their availability to clean and sustainable energy. It is used in over 32 countries<sup>26</sup> around the world and the application of nuclear power plants is slowly trickling down into less developed countries. Nuclear energy is a complex topic with many potential benefits and drawbacks, especially for unstable and developing nations. One of the major concerns associated with nuclear energy is the potential health and environmental impacts of nuclear power plants, which can be particularly severe in nations that are not yet developed. Nations with weak infrastructure and limited resources to help them address the negativities of nuclear power, are more vulnerable to disaster.

Nuclear energy can present serious health hazards in unstable and developing countries. The possibility of radiation exposure is one of the key concerns. Exposure to radioactive waste from nuclear power plants can result in a variety of health issues, including cancer, birth defects, and other serious disorders<sup>27</sup>. This waste can stay toxic for thousands of years, making it harder to detect or get rid of. The consequences of radiation exposure can be particularly serious in

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<sup>26</sup>*Nuclear Power in the World Today- World Nuclear Association.*

<https://world-nuclear.org/information-library/current-and-future-generation/nuclear-power-in-the-world-to-day.aspx>

<sup>27</sup>Radiation Health Effects- United States Environmental Protection Agency (EPA),

<https://www.epa.gov/radiation/radiation-health-effects>



areas that are still developing and that have few resources. Radiation exposure can cause a wide range of health problems, depending on the level and duration of exposure. Acute radiation syndrome (ARS)<sup>28</sup> is a condition that can occur when a person is exposed to high levels of radiation over a short period of time. Symptoms of ARS can include nausea, vomiting, diarrhea, skin burns, and even death in severe cases. In unstable and developing regions, limited access to healthcare and medical resources can exacerbate these health risks.

Healthcare in developing nations can be limited and inadequate, due to a range of factors, including weak infrastructure, limited resources, and political instability. In many developing nations, access to essential healthcare services is limited or nonexistent, which poses a pressing issue when radiation becomes relevant in these nations. One of the main challenges is the lack of healthcare infrastructure. Many developing nations lack the necessary healthcare facilities, equipment, and personnel to provide adequate care to their populations<sup>29</sup>. In addition, many healthcare facilities in developing nations are poorly maintained and lack basic amenities, such as clean water and sanitation facilities. Many developing nations also have limited financial resources to invest in healthcare, which can limit their ability to provide basic healthcare services to their populations. Thousands of citizens in developing countries have suffered painful deaths because of radiation poisoning and the lack of accessible healthcare in these nations.

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<sup>28</sup>*Acute Radiation Syndrome - CDC*

[https://www.cdc.gov/nceh/radiation/emergencies/arsphysicianfactsheet.htm#:~:text=Acute%20Radiation%20Syndrome%20\(ARS\)%20\(,usually%20a%20matter%20of%20minutes\).](https://www.cdc.gov/nceh/radiation/emergencies/arsphysicianfactsheet.htm#:~:text=Acute%20Radiation%20Syndrome%20(ARS)%20(,usually%20a%20matter%20of%20minutes).)

<sup>29</sup>*Strengthening Health Systems in Developing Countries-American Public Health Association (APHA),*  
<https://www.apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2014/07/23/09/09/strengthening-health-systems-in-developing-countries#:~:text=The%20health%20systems%20in%20countries,of%20services%2C%20absence%20of%20community>

Nuclear power plants also pose multiple environmental risks in developing or unstable nations. Developing countries frequently struggle with maintaining a balance between their energy needs and environmental concerns. One energy option that would help fulfill the rising energy needs of emerging countries is nuclear energy, but it comes with serious environmental dangers. The possibility of nuclear accidents is one of the main hazards connected to nuclear energy. Highly specialized equipment and staff are required for nuclear power facilities to function safely, and in many unstable countries, this type of equipment and personnel is not available. The risk of a nuclear catastrophe is significantly greater in underdeveloped countries, where infrastructure and safety laws may be lacking or nonexistent. Radioactive material might be released into the environment during a nuclear power plant disaster, endangering both people and wildlife severely.<sup>30</sup> Nuclear power plants also release radiation which can be harmful to animals in surrounding areas. Radiation spills or any type of nuclear explosion can take decades to clean up and frequently leads to lands having to be abandoned altogether. While nuclear energy can provide a cleaner source of energy, its potential environmental impacts are significant, especially in developing nations.

## B. Reducing the Use of Fossil Fuels

Reducing the usage of fossil fuels in fragile or developing countries is a crucial objective for both economic and environmental reasons. Fossil fuels can be especially harmful to emerging nations. First off, the usage and production of fossil fuels may have detrimental effects on the

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<sup>30</sup>*What are the Effects of Nuclear Accidents?* - World Nuclear Association,  
<https://world-nuclear.org/nuclear-essentials/what-are-the-effects-of-nuclear-accidents.aspx>

environment and human health, with poorer nations being disproportionately affected. Fossil fuel extraction, for instance, can result in deforestation, water pollution, and soil degradation<sup>31</sup>, which can impact local ecosystems and diminish the amount of natural resources available to local residents. Burning fossil fuels can also generate airborne contaminants including sulfur dioxide, nitrogen oxides, and particulate matter<sup>32</sup>, which can aggravate respiratory conditions and other health issues. They are also a key source of greenhouse gas emissions that contribute to climate change. The use of nuclear energy for fossil fuels is one possible answer to this issue.

Nuclear energy works to provide a more reliable and sustainable source of energy, as opposed to fossil fuels, which developing nations currently use. Large-scale energy production from nuclear power plants may be accomplished with very modest levels of greenhouse gas emissions, which can assist in reducing the nation's carbon footprint<sup>33</sup> and minimize the effects of climate change. Additionally, nuclear power plants can aid in reducing reliance on imported energy sources, strengthening the nation's energy security and lowering the economy's susceptibility to outside shocks.

For underdeveloped countries, nuclear energy can also provide major economic advantages. Nuclear power facilities need considerable infrastructure and highly skilled labor,

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<sup>31</sup>*Understanding Global Change- Resource Extraction*,  
<https://ugc.berkeley.edu/background-content/resource-extraction/>

<sup>32</sup>*The Sources and Solutions: Fossil Fuels - United States Environmental Protection Agency*  
<https://www.epa.gov/nutrientpollution/sources-and-solutions-fossil-fuels>

<sup>33</sup>*How can Nuclear Combat Climate Change- World Nuclear Association*.  
<https://world-nuclear.org/nuclear-essentials/how-can-nuclear-combat-climate-change.aspx>

which may boost employment and the economy<sup>34</sup>. Additionally, the usage of nuclear energy may contribute to a decrease in the price of power, making it more accessible to individuals and companies and encouraging economic growth. It is important to attempt to adapt to new types of energy, including nuclear energy, even in developing or less economically profound areas.

### C. Energy Independence and Security

Nuclear energy can play a crucial role in ensuring energy independence and security for developing regions. By reducing dependence on imported fuels, diversifying their energy sources, and strengthening national sovereignty, these regions can have a sustainable future. Developing regions often depend on imported fossil fuels to meet their energy needs, which can leave them vulnerable to price fluctuations and supply disruptions, with other nations or independently. Nuclear energy offers a viable alternative by utilizing domestically available uranium as fuel. Nuclear power can help these nations reduce their dependence on imported fuels, from other countries or businesses, and enhance their energy self-sufficiency. Also, relying on a single energy source can pose risks to energy security. Nuclear energy provides a stable and continuous source of electricity, so that there are no risks.

The establishment of a nuclear energy sector in a developing or developed nation can significantly enhance energy security. Nuclear power plants operate continuously and can provide a reliable supply of electricity, reducing the risk of power outages and disruptions. This stability is especially crucial for industries and businesses in order to accomplish uninterrupted

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<sup>34</sup>*Advantages and Challenges of Nuclear Energy- Office of Nuclear Energy.*  
<https://www.energy.gov/ne/articles/advantages-and-challenges-nuclear-energy>

work and economic growth. By investing in nuclear energy, these regions can strengthen their national sovereignty and reduce external dependencies, to reduce disagreements with other countries.

#### **IV. Case Study: Bangladesh Plant Breeding**

There are numerous ways that nuclear energy is used all around the world, including energy sources, agriculture, and as alternative fuels. Bangladesh has been investigating the application of nuclear technology in agriculture for a number of years and has put in place a number of projects targeted at increasing agricultural yields and ensuring the nation's food security. Plant breeding is one area where nuclear technology has been used. One of the biggest goals in Bangladesh was to create a rice variant that would have the ability to mature a lot faster than regular rice. They did so by using nuclear technology and it was overall proven successful. According to the IAEA, “conventional rice takes around 140 to 150 days to ripen, but the Binadhan-7 mutant variety, developed by BINA in 2007 with the support of the Joint Division, matures in 110 to 120 days.” This makes rice production a lot more sustainable. It also works towards increasing the overall total crop yield of rice, therefore increasing the economy in Bangladesh. Because of nuclear energy in agriculture, Bangladesh is one of the best countries when it comes to success in crop breeding. Over 58 new rice mutations have been created thanks to nuclear technology.<sup>35</sup>

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<sup>35</sup>*Bangladesh Plant Breeding Program Adds Variety to the Seasonal Plant Breeding Calendar- IAEA*  
<https://www.iaea.org/sites/default/files/iaea-success-stories-3.pdf>

In order to create novel crop types that are more resilient to drought and other environmental challenges as well as pests and diseases, the Bangladesh Atomic Energy Commission (BAEC).<sup>36</sup> has also developed a number of nuclear facilities. Bangladesh uses nuclear technology to make new rice varieties through a process called mutation breeding. This involves exposing rice seeds to radiation in order to induce genetic mutations that can lead to desirable traits, such as increased yield, disease resistance, and tolerance to environmental stresses like drought and salinity.

The BAEC has used a number of additional nuclear techniques in agriculture in addition to mutant breeding, such as the use of isotopic and nuclear techniques to increase soil fertility and crop nutrient absorption. These methods employ isotopes to monitor nutrient transport in the soil and plants, which can assist farmers maximize fertilizer use and increase crop yields. Bangladesh uses nuclear energy to help increase its economy and to become more environmentally sustainable. Nuclear energy can pose long term solutions if used appropriately and safely.

## **V. Guided Questions:**

1. How can developing/unstable countries balance the need for energy security with concerns about nuclear proliferation and environmental risks?
2. How can the benefits of nuclear energy be maximized while minimizing the risks that nuclear energy poses?

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<sup>36</sup>Bangladesh Atomic Energy Commission <http://www.baecbd.org/dbemployee/employee.php>

3. What are some of the key legal frameworks that must be put in place to support a nuclear energy program in a developing country, and how can these frameworks be designed to ensure the highest levels of safety, security, and transparency?
4. How can countries protect the people and wildlife affected by nuclear mishaps?
5. What are the specific energy demands of developing regions and how can these demands be met sufficiently?
6. Do these regions have the infrastructure and funding needed to support nuclear energy plants? If not, how can they diversify their energy usage effectively?

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