



United Nations Environment Programme  
**ENVIRONMENTAL IMPACT OF  
FOSSIL FUELS**

**BACKGROUND GUIDE B**

## Director's Letter

Dear Delegates,

My name is Chantal Lee and it is my distinct pleasure to be directing the United Nations Environment Programme (UNEP) at OMUN III, along with your Chair, Cindy Ma, and your Assistant Director, Shaama Taank. I am currently a senior attending the International Baccalaureate Program at Richmond Secondary School, and have been involved in Model UN since Grade 10. Model UN serves as an opportunity for delegates to develop their public speaking skills while expanding their knowledge on global issues and current events. In my free time, you can always find me reading, binging anime, catching up on sleep, or getting food with my friends!

UNEP, a Specialized Agency, focuses on solving prominent environmental issues around the world. Delegates are encouraged to collaborate with one another to come up with effective solutions to solve the topics at hand. I hope to deliver a committee that is relevant to the world today, and keep delegates engaged throughout the course of the weekend.

The two topics this year focus on current issues that pose a dire threat to our future if not addressed immediately - unsustainable practices of corporations, and the environmental impact of fossil fuels. Delegates must find ways to keep big corporations in check, as well as seek green alternatives for the future's energy source. Only by doing so will we mitigate climate change. These two topics adequately sum up our interaction with the environment and its enormous impact on countries worldwide regardless of geography.

I hope you all enjoy researching these topics so you are well equipped for the upcoming conference! Please do not hesitate to contact me if you have any questions, and I look forward to meeting everyone at OMUN III!

Sincerely,

Chantal Lee

UNEP Director -- OakridgeMUN (III) 2021

## Committee Overview

The United Nations Environment Programme is a leading authority that advocates for environmental action across the world. They work to implement environmentally sustainable policies within the United Nations system as well as within developing nations. UNEP has successfully inspired citizens from around the globe to take environmental action, and promote research and development that will help reduce unsustainable practices.

UNEP was first established in June 1972 at the Stockholm conference on the Human Environment. The headquarters for their organization was set in Nairobi, Kenya, making it the first UN agency with headquarters in a developing country. The Founding Executive Director of UNEP was Maurice Strong, a Canadian businessman and diplomat, whose courageous leadership drove forward to a new era of environmental diplomacy and awareness.

UNEP is most recognized for their establishment of an international monitoring system called “Earthwatch” in 1972. This alerts all governments of essential environmental crisis information so that nations may act swiftly and cohesively to implement solutions. Another one of UNEP’s notable achievements is the India Solar Loan Programme launched in 2003. This is a four-year program between UNEP, the UNEP Risoe Centre on Energy, Climate and Sustainable Development, and India’s largest banking groups, aiming to finance clean solar energy for underdeveloped sectors in Southern India. Additionally, UNEP has been helping to develop the Acid Deposition Monitoring Network in East Asia since 2001. They have already achieved significant results, providing countries with extensive research and increasing government collaboration to solve acid deposition problems. UNEP has successfully pushed forward many international agreements, such as the 1987 Montreal protocol, which regulates the production of ozone-depleting substances, and The Minamata Convention on Mercury in 2013, which strives to reduce the environmental impact of mercury.

Moving forward, UNEP continues to advocate for the implementation of the 2030 Agenda For Sustainable Development. The agenda calls for cohesive international government policies to target environmental issues. With the growing urgency for drastic environmental change in this decade, UNEP’s work on climate action has become more important than ever as they battle to preserve a sustainable world for future generations.

## Topic Introduction

As global warming continues to threaten the globe, countries must address the issue of fossil fuel depletion in the near future. The burning of fossil fuels not only causes community health risks and pollution but also intensifies global warming. Firstly, the burning of fossil fuels can release harmful chemicals like sulphur dioxide and carbon monoxide into the air. At the same time, fossil fuel-powered vehicles produce poisonous carbon monoxide and nitrogen oxide, which leads to smog on hot days. The health effects of air pollution include severe asthma, observed in regions downwind of coal power plants. Secondly, the sulfur dioxide released from untreated coal smoke can lead to the production of acid rain, and oil spills poison marine ecosystems. While water pollution is not exclusive to just fossil fuels (as even clean energy sources can pollute the water), fuel spillage pollutes water and endangers plants, animals, and human health. Thirdly, methane and carbon dioxide emissions from electricity plants, gasoline-burning vehicles, cement manufacturing, and other industrial processes trap heat in the Earth's atmosphere, leading to a sharp increase in global temperatures in recent decades.

The international community has already made progress by introducing renewable energy sources such as solar and wind power as alternatives to fossil fuels. However, it is vital to find energy sources that are both sustainable and reliable for a full-scale shift towards clean energy.

Nuclear energy is known to be a clean, zero-waste option for generating electricity. However, the high risks of using nuclear energy and the expensive manufacturing costs have created controversy over this energy source. Another major environmental concern related to nuclear power is the creation of radioactive wastes such as uranium mill tailings and used reactor fuel. These materials can remain radioactive and dangerous to human health for thousands of years. Radioactive wastes are subject to special regulations that govern their handling, transportation, storage, and disposal to protect human health and the environment.

Similarly, biomass energy is also another renewable alternative for electricity generation. Unfortunately, this type of energy also comes with negative environmental consequences. Biomass refers to the renewable organic material from plants and animals that, containing stored chemical energy from photosynthesis. Biomass can be burned directly for heat or converted to renewable fuels through direct combustion, thermochemical, chemical and biological conversion. However, the additional environmental consequences to consider include deforestation, pollution, and water use. Firstly, biomass requires energy crops such as grass and other inedible, high-cellulose crops to be grown on a large scale. Removing forests for energy crops can increase greenhouse gases as 25 to 30 percent of greenhouse gases released each

year result from deforestation. Secondly, despite being a relatively clean alternative, biomass still generates harmful toxins as it's combusted. Emissions vary greatly depending on the plant's feedstock, but pollutants like nitrogen oxide, sulfur dioxide, carbon monoxide and particulate matter are common. Thirdly, bioenergy plants require a lot of water for irrigation. On a large scale, this exacerbates drought conditions, impacting aquatic habitats and the amount of water supply available for other purposes such as drinking and hydropower.

<https://www.masterclass.com/articles/fossil-fuels-explained#3-impacts-of-fossil-fuel-us-e-on-the-environment>

<https://www.nrdc.org/stories/fossil-fuels-dirty-facts#sec-future>

<https://www.nationalgeographic.org/encyclopedia/nuclear-energy/>

<https://www.eia.gov/energyexplained/biomass/>

<https://www.energysage.com/about-clean-energy/biomass/environmental-impacts-biomass/>

<https://sciencing.com/pros-cons-of-coal-energy-13638154.html>

<https://www.nsenergybusiness.com/features/newmajor-pros-and-cons-of-biomass-energy-5845830/>

<https://springpowerandgas.us/the-pros-cons-of-nuclear-energy-is-it-safe/>

## **Historical Analysis**

For generation after generation, humans have relied on fossil fuels as their primary source of energy. According to historical finds, forms of coal, natural gas, and petroleum were used by numerous civilizations thousands of years ago. Of course, the dosage used nowadays vastly exceeds the past. Studies have shown that consuming vast amounts of fossil fuels is highly damaging to the environment. Whether that be the process of mining the fossil fuels from earth's crusts or burning them, both generate immense amounts of pollution into the atmosphere. Additionally, fossil fuels are unsustainable energy sources, so they will eventually run out.

Fossil fuels contain carbon emitted into the earth's atmosphere when burned, resulting in climate change. Past geologic processes in the Archean Eon resulted in the formation of fossil fuels in the earth's crust. Specifically, photosynthesis produced remains of organic matter derived from algae and bacteria.

Great Britain's Industrial Revolution marked the beginning of fossil fuel consumption. As of today, over 80% of developed countries' energy comes from fossil fuels. As

mentioned previously, fossil fuels are an unsustainable energy source, so the reserves are limited, despite new deposits being discovered every once in a while.

Petroleum was the first to be used by civilizations. Although they lacked the technology to drill the oil, they managed to find amounts that seeped on the surface. These were primarily used for road construction, waterproofing boats, and gluing mosaic works on floors and walls.

Due to its composition, fossil fuel combustion emits carbon dioxide. As a greenhouse gas, carbon dioxide absorbs radiation from the earth's surface and reflects it back. This results in an increase in carbon dioxide in the atmosphere, leading to accelerated global warming.

Luckily, advancements in technology can save the Earth! Many countries have developed renewable energy sources, such as wind and solar energy, to combat the prevalent issue of global warming. Nuclear energy also acts as a solution, as it is considered clean energy.

The history of nuclear power starts with science in Europe, blossoms in the UK and USA due to their technological and economic might, languished for a few decades, then has a new growth spurt in east Asia. In the process, over 17,000 reactor-years of operation have been accumulated in providing a significant proportion of the world's electricity.

From the late 1970s to about 2002, the nuclear power industry suffered some decline and stagnation. The share of nuclear power in world electricity from the mid-1980s was fairly constant at 16-17%. Many reactor orders from the 1970s were cancelled, and the uranium price dropped accordingly. However, by the late 1990s, the first of the third-generation reactors was commissioned in Japan. This became the sign of recovery to come for the nuclear industry.

In this new century, several factors came together to revive the prospects for nuclear power. First was the scale of projected increased electricity demand worldwide, particularly in rapidly-developing countries. Secondly was the awareness of energy security; it is essential that each country has assured access to affordable energy, especially to dispatchable electricity able to meet demand at all times. Third was the need to limit carbon emissions due to concerns about climate change.

<https://oilprice.com/Energy/Energy-General/The-Complete-History-Of-Fossil-Fuels.html>  
<https://www.britannica.com/science/fossil-fuel>

<https://world-nuclear.org/information-library/current-and-future-generation/outline-history-of-nuclear-energy.aspx>

## **Current Situation**

As global warming continues to threaten the globe, countries struggle to find renewable and sustainable energy sources to replace fossil fuels and reduce greenhouse gas emissions. Fossil fuels include coal, oil, and natural gas, which are key contributors to fueling the world's heat, electricity, and transportation. However, burning fossil fuels releases carbon dioxide and other greenhouse gases into the atmosphere, trapping heat. With 80% of the world's energy being supplied by fossil fuels, they have become the primary contributors to climate change. Many available energy sources are alternatives to fossil fuels. However, these sources come with their own side effects, financial challenges, and accessibility issues. With that being said, UNEP has to come up with a sustainable solution before the climate crisis escalates further.

### *Fossil Fuel Extraction*

Fossil fuels must be extracted from the earth before they can be used, which has caused land degradation. Strip mining is performed on large stretches of land to expose the coal and oil supplies beneath, which leads to entire forests and mountaintops being blasted and scraped away as a result. Fossil fuels also jeopardize waterways and groundwater, and acid runoff often leaches into streams, rivers, and lakes due to coal mining. During oil extraction and transport, oil spills can occur, endangering ocean species and ecosystems. Drilling and mining also create large volumes of wastewater contaminated with pollutants that can leak or overflow into waterways and aquifers. Recently, oil industries have been practicing a method called fracking to drill into the earth and extract oil and natural gas, which contaminates water supplies and damages rural landscapes.

### *Burning Fossil Fuels*

The burning of fossil fuels produced 34.1 billion tonnes of carbon dioxide in 2020. Coal alone causes 46% of global carbon emissions, and coal-fired power plants are extremely dangerous for the environment as well. Active oil and gas wells, as well as processing facilities, all create harmful air pollution. When fossil fuels are burned, carbon dioxide, nitrogen oxides and ammonia are released into the atmosphere, leading to smog and acid rain. Methane is another dangerous greenhouse gas that releases carbon when it is trapped and burned. When fossil fuels are used as energy sources, they pollute the air through cars, trucks, and boats, which create 15 to 20 percent of annual global emissions.

### *Ocean Acidification*

The ocean absorbs about a quarter of all human-made emissions. Therefore, when we burn fossil fuels, the ocean absorbs more carbon, making the seas more acidic. The Industrial Revolution marked the beginning of burning fossil fuels, and since that time the ocean has become 30% more acidic. As acidity levels rise, the ecosystems and food chains of marine organisms are heavily impacted.

### *Fossil Fuel Use Across The World*

Due to China's frequent practice of burning coal through industrial power plants and steel manufacturing, China produces the greatest amount of global emissions. Being one of the largest oil importers, the country also produces emissions through their massive use and production of motor vehicles.

The United States is the second-largest contributor to the problem, and their power and transportation sectors create three-quarters of the world's emissions. The US also has many coal-fired power plants, which generate 42% of their mercury emissions. Transportation is the second most significant greenhouse gas contributor in the US, making up 29% of their total emissions in 2019. Coal and power plants are also main sources of India's carbon emissions, as the nation uses fossil fuels to accomplish their goal of creating an urban, industrialized economy.

Power fueled by coal in China, India, and the United States contributed to 85% of the global emissions increase. On the other hand, global emissions decreased in Germany, Japan, Mexico, France, and the UK due to their newly implemented goals and guidelines. Emissions have greatly declined in Belgium since they shut down their coal-fired power plants in 2016.

### *Alternative Energy Sources*

Sustainable energy sources must be implemented across all industries in order to reduce global emissions. However, these alternative sources have to be financially accessible and beneficial for all nations to ensure that they do not cause adverse economic impacts. Nuclear energy, for example, is a clean, zero-emission energy source that generates power through fission. Nuclear energy plants take up just one square mile of land space, and since they are constantly producing large amounts of energy at fast rates, they are able to meet the high global energy demand. The United States was able to avoid more than 476 million metric tons of carbon emissions in 2019 with the help of nuclear energy. However, the uranium that is required to create nuclear energy is a non-renewable source, and long-term reliance on nuclear energy will deplete the earth's limited uranium resources. While operating a nuclear energy plant is inexpensive, there are high upfront costs involved with building a plant in the

first place. Governmental care and finances are also required to safely dispose of the radioactive nuclear waste that this form of energy produces.

Another alternative to fossil fuels is biomass energy. This is an organic material that stores sunlight in the form of chemical energy and comes from plant material. This energy has the potential of replacing fossil-fueled transportation with biofuels such as ethanol, biodiesel, and renewable gasoline. Biomass energy can also be burned in order to produce electricity and heat. This form of energy is renewable and carbon neutral, because new crops will continue to grow back after each harvest. This technology is also much cheaper to use than fossil fuels, and allows manufacturers to generate higher profit with lower output. Using this energy reduces the amount of garbage deposited in landfills by 60 to 90 percent, because solid waste can be burned and recycled into biomass energy. However, bio-fueled transportation is not as efficient as using fossil fuels. Biomass power plants also take up 1000 times more land space than fossil fuel plants. Additionally, the use of animal and human waste to produce biomass energy increases methane gas emissions. Another significant downside is the volume of trees that are burned to produce this form of energy, which can lead to severe deforestation.

Geothermal energy is another viable option to use as an alternative to fossil fuels. This energy uses heat from the earth's core to produce electricity. The thermal energy inside the earth's crust is a renewable and reliable source. Geothermal heat pump systems use 25 to 30 percent less energy than conventional systems, they are long-lasting and require low system maintenance. Geothermal power plants can also consistently produce more electricity than fossil fuels with a smaller carbon footprint. These power facilities can be used to fuel greenhouses, farms, food production, as well as provide electricity and heating for individual homes. This may even be a cost-efficient, sustainable method for food production and agriculture in developing countries. While geothermal energy's greenhouse gas emission rate is significantly lower than the use of fossil fuels, the extraction of geothermal energy from the earth does release some gases such as methane, ammonia, and carbon dioxide. Government funding for research and technological developments is required to maximise its potential as an alternative energy source.

### *Future Impacts*

As fossil fuels are one of the largest global polluters, we must make significant transitions toward renewable energy to reduce the impacts of climate change before it is too late. By 2050, the reduction of oil use and the abolition of coal-fired power plants are hopeful prospects as more economies move toward the use of sustainable energy. Natural gas, however, is projected to increase in energy demand, as it is efficient for heating and power use with low prices. Failing to implement sustainable energy sources across the world within the next decade will contribute to irreversible climate

damage. The arctic could be ice free in the summers, rising sea levels could affect 1 billion people by 2050, and heatwaves could affect people across the globe. Countries must therefore transition to the use of renewable energy, ensuring that their actions are economically and environmentally sustainable, to contribute to a better future.

### Past Actions

#### *Sustainable Development Goals (SDGs)*

The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by the United Nations in 2015 as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity.

There are 17 SDGs in total, all recognizing that development must balance social, economic and environmental sustainability. The SDGs are designed to end poverty, hunger, AIDS, and discrimination against women and girls.

#### *Goal 7: Ensure Access to Affordable, Reliable, Sustainable and Modern Energy*

The world is progressing towards Goal 7 as energy becomes more sustainable and widely available. Access to electricity in impoverished countries has begun to accelerate, energy efficiency continues to improve, and renewable energy is making impressive gains in the electricity sector.

Nevertheless, more focused attention is needed to improve access to clean and safe cooking fuels and technologies for over 3 billion people worldwide, to expand the use of renewable energy beyond the electricity sector, and to increase electrification in sub-Saharan Africa.

#### *SDG 7 targets:*

1. By 2030, ensure universal access to affordable, reliable and modern energy services
  2. By 2030, increase substantially the share of renewable energy in the global energy mix
  3. By 2030, double the global rate of improvement in energy efficiency
- A. By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology
  - B. By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States, and land-locked developing countries, in accordance with their respective programmes of support

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### *The Energy Progress Report*

The Energy Progress Report is a joint report of the Custodian Agencies – the International Energy Agency (IEA), the International Renewable Energy Agency (IRENA), the United Nations Statistics Division (UNSD), the World Bank, and the World Health Organization (WHO).

The Energy Progress Report provides a global dashboard to register progress on the three pillars of SDG7: ensuring universal energy access, doubling progress on energy efficiency, and substantially increasing the share of renewable energy. The report also tracks progress towards enhanced international cooperation for accessing clean and renewable energy by 2030 and the expansion of infrastructure and technology upgrades to supply sustainable energy services for developing countries. It assesses the progress made by each country and provides a snapshot of how far the world is from achieving the 2030 Sustainable Development Goals targets.

<https://sdgs.un.org/goals/goal7>

<https://www.un.org/sustainabledevelopment/energy/>

<https://unstats.un.org/sdgs/report/2019/goal-07/>

<https://trackingsdg7.esmap.org/>

## **Case Studies**

### *Case 1: Fukushima Nuclear Accident*

The Fukushima accident occurred in 2011 at the Fukushima Daiichi (“Number One”) plant in northern Japan. It was known as the worst nuclear event since the meltdown at Chernobyl in the former Soviet Union 25 years prior. Starting with an earthquake, it resulted in 465,000 evacuations, \$360 billion in economic losses and increased radiation levels in Tokyo.

The Fukushima Daiichi Nuclear Power Plant is located in the town of Okuma in northeastern Fukushima prefecture. It sits on the country's east coast, about 220km (137 miles) northeast of the capital Tokyo. The facility itself, operated by the Tokyo Electric and Power Company (TEPCO), comprises six boiling-water reactors constructed between 1971 and 1979.

On March 11, 2011, the 9.0-magnitude quake that began this disaster struck Japan’s eastern coast as the most powerful earthquake ever recorded, so forceful that it shifted the Earth off its axis. It triggered a tsunami that swept over the main island of Honshu, killing more than 18,000 people and wiping entire towns off the map.

Systems at the nuclear plant detected the earthquake and automatically shut down the nuclear reactors. But emergency diesel generators remained turned on to keep coolant pumping around the cores, which were still incredibly hot even after reactions stop.

## OakridgeMUN III - UNEP Backgrounder B

Rising residual heat within each reactor's core caused the fuel rods in reactors 1, 2, and 3 to overheat and partially meltdown, leading at times to the release of radiation. Workers sought to cool and stabilize the three cores by pumping seawater and boric acid into them. But due to the concerns over possible radiation exposure, government officials established a 30-km (18-mile) no-fly zone around the facility, and a land area of 20-km (12.5-mile) radius around the plant, covering nearly 600 square km (approximately 232 square miles), was evacuated.

There were also explosions resulting from the buildup of pressurized hydrogen gas that occurred in the outer containment buildings enclosing reactors 1 and 3 on March 12 and March 14, respectively. A third explosion occurred on March 15 in the building surrounding reactor 2. In response, government officials designated a wider zone, extending to a radius of 30 km around the plant, within which residents were asked to remain indoors. The explosion, along with a fire touched off by rising temperatures in spent fuel rods stored in reactor 4, led to higher levels of radiation from the plant. Radioactive material began leaking into the atmosphere and the Pacific Ocean, prompting an evacuation and an ever-widening exclusion zone.

A decade later, that zone remains in place, and many residents have not returned. Authorities believe it will take up to 40 years to finish the work, which has already cost Japan trillions of yen. To conclude, this accident continues to haunt the world as a constant reminder of the risks of using nuclear energy.

<https://world-nuclear.org/information-library/safety-and-security/safety-of-plants/fukushima-daiichi-accident.aspx>

<https://www.history.com/news/fukushima-nuclear-disaster-japan-earthquake-timeline#:~:text=3%3A27%20p.m.%3A%20The%20earthquake,feet%20high%2C%20breaches%20the%20wall>

<https://www.bbc.com/news/world-asia-56252695>

<https://www.britannica.com/event/Fukushima-accident>

*Case 2: Europe's Energy Crisis*

European power prices have spiralled to multi-year highs in recent weeks as of September 2021, ranging from powerful commodity and carbon prices to low wind output. What's more, the record run in energy prices is not expected to end any time soon, with energy analysts warning that the rise is likely to persist throughout winter.

The October gas price at the Dutch TTF hub, a European benchmark, was seen to climb to a record high of 79 euros a megawatt-hour on Wednesday. The contract has risen more than 250% since January, while benchmark power contracts in France and Germany doubled. Europe's top chemicals firm BASF SE said it has been unable to entirely swerve the impact of record-breaking electricity prices despite producing 80% of its power. Aurubis AG, the continent's biggest copper producer, said energy costs have already dragged down profits and will continue to weigh on margins for the rest of the year. Things got so bad in the U.K. that a major fertilizer producer shut two plants, and in Norway, an ammonia manufacturer also curbed production.

In the U.K., where electricity bills are now the most expensive in Europe, power prices have soared amid the country's high dependence on gas and renewables to generate electricity. British day-ahead electricity prices rose nearly 19% to reach 475 pounds on Wednesday. The contract was already trading near record highs shortly after a fire at a U.K.-France power link cut electricity imports to Britain.

The head of European power analysis at S&P Global Platts Analytics, Glenn Rickson, believes that gas prices are the biggest factor in this astronomical rise. Higher gas prices have also been a "big driver" in lifting carbon and coal prices to record highs. However, other supporting factors are at play, such as low wind generation and nuclear plant unavailability across the continent.

European gas prices had accelerated since the start of April, when icy weather conditions caused Europe's gas in storage to dip below the pre-pandemic five-year average, indicating a potential supply crunch. Europe has since struggled to bring the gas supplies necessary for the winter period back to where they should be. An economic rebound as countries eased Covid-19 restrictions also coincided with higher-than-expected demand that led to a gas shortage.

This winter, Europe is threatened by blackouts if the weather gets colder; Goldman Sachs Group Inc. warns that the region's industrial users will need to start curbing consumption. The continent is running out of time to refill its depleted storage sites before the heating season, starting in about a month. Inventories are currently at their lowest level in more than a decade for this time of the year.

*Links:*

<https://www.cnn.com/2021/09/16/europes-energy-crisis-is-making-the-market-nervous-ahead-of-winter.html>

<https://www.bloomberg.com/news/articles/2021-09-17/energy-crisis-worsen-as-rally-hurts-europe-s-industrial-giants>

<https://www.bnnbloomberg.ca/europe-s-energy-crisis-shows-the-downside-of-fossil-fuels-1.1651319>

## **Bloc Positions**

When approaching global fossil fuel solutions, it is imperative to consider each countries' accessibility to a variety of renewable energy sources. For developing countries, reducing carbon emissions is not a priority; their focus is on expanding their economies and alleviating poverty, a goal that has typically had direct links to increasing carbon emissions. However, a report by the World Resources Institute demonstrates that 21 developing countries have reduced their emissions while continuing to grow their economies through the use of renewable energy. For developing nations to make more drastic transitions toward fossil fuel alternatives, they will need the financial support of developed countries. Therefore, creating renewable energy strategies shaped to each country's unique economic situations, financial abilities, and geographical positions is a vital consideration that will help reduce carbon emissions worldwide

### *Nuclear Energy: Developed Economies*

Nuclear energy has been a viable solution for most nations with developed economies, as this alternative energy type requires high upfront costs and extensive governmental safety regulation. There are more than 50 nuclear reactors under construction worldwide, and most of them reside in China. The USA has a total of 96 operational nuclear reactors, the highest number on the planet. Last year, nuclear energy made up about 20% of the country's electricity generation. They plan to utilize nuclear energy to help them achieve their goal of a net-zero carbon economy by 2050. France is also home to 58 nuclear reactors, which produce about 75% of the country's electricity. In Japan, nuclear energy has been a national strategic priority. They plan to have nuclear power produce 20% of their electricity by 2030, which will require more significant investments and commitments to this energy source.

### *Hydropower Energy: Middle To High-Income Economies*

The main four countries that produce 50% of all hydropower are China, Brazil, Canada, and the USA. China is the leading hydropower producer globally, as it contains the largest hydropower station, and Canada and Russia are also home to massive hydroelectric power stations. In Brazil, hydropower occupies a significant share of the country's renewable energy capacity, paired with the expansion of wind and biomass. These energy sources will play an important role in helping them reduce their emissions.

After being built, hydropower plants are incredibly cheap, low-maintenance, and efficient for electricity in any country. However, the upfront costs of building a hydropower plant are substantial, and hydro plants need to be built in regions with resources such as consistent water supply and vast amounts of land. Therefore, while wealthier nations in East Asia and South America can utilize this energy to its fullest potential, developing nations may need support in creating economic development strategies and long-term investment plans to implement this form of energy successfully.

### *Geothermal Energy: Low To High-Income Economies*

Different types of geothermal energy are available in different parts of the world. Some nations have significant sources of hot underground water that are easily accessible. Countries with these geographical positions can easily rely on geothermal energy as an accessible, inexpensive alternative to fossil fuels. However, other nations that aren't located in these regions have to drill deep into the earth at much greater costs in order to access geothermal energy. Geothermal sources in Iceland, for example, account for 66% of their primary energy use. This is due to the high levels of volcanic activity in this region, which make it an ideal country for the use of geothermal energy. Similarly, New Zealand's volcanic and tectonic features allow them to produce geothermal energy through their high-temperature fields easily; this energy has great potential in helping the nation achieve its goal of 100% renewable energy by 2030. Geothermal energy is also an excellent energy option for many developing countries such as Costa Rica, Nicaragua, Kenya, the Philippines, Mexico, and Indonesia.

*Solar and Wind Energy: Low To High-Income Economies*

Wind and solar energy will provide a tenth of the world's electricity in 2020, as it is an accessible solution for various countries. The world leaders in solar and wind energy production are Denmark and Uruguay. Uruguay is now almost 100% powered by renewables due to its heavy investments in wind and solar power. Denmark also gets over half of its electricity from wind and solar power. Similarly, Germany aims for renewable energy to account for 65% of their energy demand, with hydro and wind energy being the main sources of their renewable power. Morocco has recently completed the largest concentrated solar plant in the world, and their wind power has the potential to help them reach their target of eliminating fossil fuels by 2050.

China, the European Union, and America stand out as the largest producers of wind and solar. However, more developing countries such as Vietnam, Mexico, India, and Turkey have also seen rapid growth and have set goals to invest in their wind and solar resources. Nicaragua, another developing country, aimed for 90% renewable energy sources by 2020 and exceeded their target through the use of solar and wind energy.

*Biomass Energy: Developing Economies*

About 14% of the world's primary energy supply is derived from biomass energy sources, but there is a difference in the types of biomass used around the world. Developed countries use wood and crops to create biofuel, while developing countries that lack non-solid fuel use agricultural waste. The greatest use of biomass energy across the world occurs within the rural areas of developing countries. For example, Kenya derives 75% of biomass energy use, India uses 50%, and 25% of Brazil's total energy is from biomass. Although developed countries use this form of energy as well, biomass plays a crucial role in most developing countries, as impoverished citizens use biomass fuels to cook food and run electricity in their villages on a daily basis.

## Guiding Questions

1. Does your country support the use of biofuel as an alternative to fossil fuels?
2. What actions can your country implement to combat climate change so future generations can have better living conditions?
3. What can be done in the short-term by countries that produce massive amounts of pollution?
4. How much has your country contributed to global warming in the past? How will your country take accountability for their actions?
5. How can you incentivize your country's citizens to reduce their carbon footprint?

## Further Research

<https://www.sciencedaily.com/releases/2008/12/081209125931.htm>

Resource on how developing countries can afford to implement environmentally sustainable technologies while developing their technology.

<https://climate.mit.edu/ask-mit/why-arent-we-looking-more-hydropower>

An article on the benefits of using hydropower energy as a major global energy source.

<https://www.worldatlas.com/articles/what-is-the-environmental-impact-of-the-fishing-industry.html>

This site expands on the environmental impacts of the fishing industry and describes unsustainable fishing techniques.

<https://www.pbs.org/newshour/economy/making-sense/4-reasons-its-hard-to-become-a-sustainable-business>

A list of struggles that industries and businesses may face when transitioning to more sustainable targets.

<https://www.enbridge.com/energy-matters/energy-school/geothermal>

This is a great resource to better understand how geothermal energy works and which countries have the easiest access to it.

## Citations

Meredith, Sam. "Europe's Energy Crisis Is Making the Market Nervous. and Analysts Expect Record-High Prices to Persist." *CNBC*, CNBC, 16 Sept. 2021, [www.cnbc.com/2021/09/16/europes-energy-crisis-is-making-the-market-nervous-ahead-of-winter.html](http://www.cnbc.com/2021/09/16/europes-energy-crisis-is-making-the-market-nervous-ahead-of-winter.html).

Wilkes, William, et al. "Energy Crisis Worsens as Rally Hits Europe's Industry Giants." *Bloomberg.com*, Bloomberg, [www.bloomberg.com/news/articles/2021-09-17/energy-crisis-worsen-as-rally-hurts-europe-s-industrial-giants](http://www.bloomberg.com/news/articles/2021-09-17/energy-crisis-worsen-as-rally-hurts-europe-s-industrial-giants).

News, Bloomberg. "Europe's Energy Crisis Shows the Downside of Fossil Fuels - BNN Bloomberg." *BNN*, 13 Sept. 2021, [www.bnnbloomberg.ca/europe-s-energy-crisis-shows-the-downside-of-fossil-fuels-1.1651319](http://www.bnnbloomberg.ca/europe-s-energy-crisis-shows-the-downside-of-fossil-fuels-1.1651319).

"Fukushima Daiichi Accident." *Fukushima Daiichi Accident - World Nuclear Association*, [world-nuclear.org/information-library/safety-and-security/safety-of-plants/fukushima-daiichi-accident.aspx](http://world-nuclear.org/information-library/safety-and-security/safety-of-plants/fukushima-daiichi-accident.aspx).

Janos, Adam. "Fukushima Timeline: How an Earthquake Triggered Japan's 2011 Nuclear Disaster." *History.com*, A&E Television Networks, 5 Mar. 2021, [www.history.com/news/fukushima-nuclear-disaster-japan-earthquake-timeline#:~:text=3%3A27%20p.m.%3A%20The%20earthquake,feet%20high%2C%20breaches%20the%20wall](http://www.history.com/news/fukushima-nuclear-disaster-japan-earthquake-timeline#:~:text=3%3A27%20p.m.%3A%20The%20earthquake,feet%20high%2C%20breaches%20the%20wall).

"Fukushima Disaster: What Happened at the Nuclear Plant?" *BBC News*, BBC, 10 Mar. 2021, [www.bbc.com/news/world-asia-56252695](http://www.bbc.com/news/world-asia-56252695).

"Fukushima Accident." *Encyclopædia Britannica*, Encyclopædia Britannica, Inc., [www.britannica.com/event/Fukushima-accident](http://www.britannica.com/event/Fukushima-accident).

Meredith, Sam. "Europe's Energy Crisis Is Making the Market Nervous. and Analysts Expect Record-High Prices to Persist." *CNBC*, CNBC, 16 Sept. 2021, [www.cnbc.com/2021/09/16/europes-energy-crisis-is-making-the-market-nervous-ahead-of-winter.html](http://www.cnbc.com/2021/09/16/europes-energy-crisis-is-making-the-market-nervous-ahead-of-winter.html).

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Wilkes, William, et al. "Energy Crisis Worsens as Rally Hits Europe's Industry Giants." *Bloomberg.com*, Bloomberg, [www.bloomberg.com/news/articles/2021-09-17/energy-crisis-worsen-as-rally-hurts-europe-s-industrial-giants](http://www.bloomberg.com/news/articles/2021-09-17/energy-crisis-worsen-as-rally-hurts-europe-s-industrial-giants).

News, Bloomberg. "Europe's Energy Crisis Shows the Downside of Fossil Fuels - BNN Bloomberg." *BNN*, 13 Sept. 2021, [www.bnnbloomberg.ca/europe-s-energy-crisis-shows-the-downside-of-fossil-fuels-1.1651319](http://www.bnnbloomberg.ca/europe-s-energy-crisis-shows-the-downside-of-fossil-fuels-1.1651319).