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Issue:
Discussing the Increasing Call for Nuclear Power in the Fight Against Climate Change

Forum:
General Assembly 4

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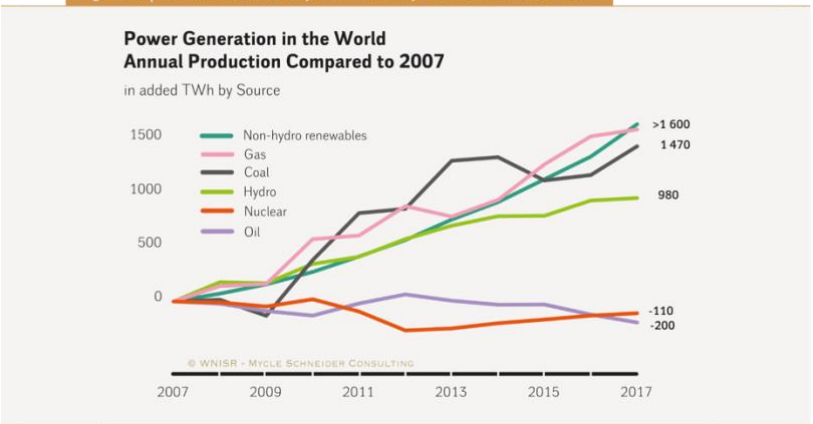
Position: Chair

Introduction

The increasing call for the use of nuclear power to overcome the negative effects of climate change has been a serious issue to debate upon in the 21st century. Climate change results in sea levels rising, a significant increase in the temperature, the acidification of oceans, deforestation, forest deterioration, the impoverishment of biodiversity, along with instantaneous and severe weather conditions. Although the International Atomic Energy Agency(IAEA) has addressed how nuclear power produces one-third of all low carbon electricity, yielding 10 percent of the world's electricity, they have further taken the health and environmental hazards caused by nuclear waste, into consideration. The release of radioactive chemicals and the disposal of this radioactive waste has been an "unresolved issue", as said by Mr Liu Zhenmin, the Under-Secretary-General for Economic and Social Affairs.

Figure 39 | Net Added Electricity Generation by Power Source 2007-2017



(A line graph on the power generation globally from 2007-2017)

According to the Sustainable Development Goals (which are included in the 2030 Sustainable Development Agenda's 13th goal) the action towards increasing emissions should be mitigated as soon as possible. In this case, despite the incidents involving radiation and the disposal of radioactive waste, nuclear power is considered to be one of the very few ways to generate electricity while also contributing less to global warming. In order to comprehend the advantages and disadvantages that nuclear power has on the intensity of climate change the causes and results of climate change and nuclear power should also be known.

Definition of Key Terms

Climate Change
Climate change alludes to crucial changes in global temperature, wind patterns, precipitation, sea-levels, and other forms of climate that transpire throughout several years or even more. Climate change results in global warming.

Global Warming
Throughout the 21st century, the Earth's temperature has risen by 0.8 degrees Celsius. This increase was caused by the enhancing concentration of carbon dioxide, methane, nitrous oxide and other greenhouse gases in the atmosphere. Scientists concluded that if these increasing greenhouse gases trap more heat in the atmosphere and warm Earth, global warming would also increase.

Nuclear power
Nuclear power is the energy produced by power plants which obtain their heat in a nuclear reactor. The reactor is where the energy is generated in. Nuclear power furnishes 15 % of global energy. The growing nuclear power industry reached its peak in the 1990s with 17% and then started to decrease because of the total electricity generation was increasing faster than the electricity produced by nuclear power. Additionally, coal and natural gas were further increasing to fulfil the growing electricity generation.

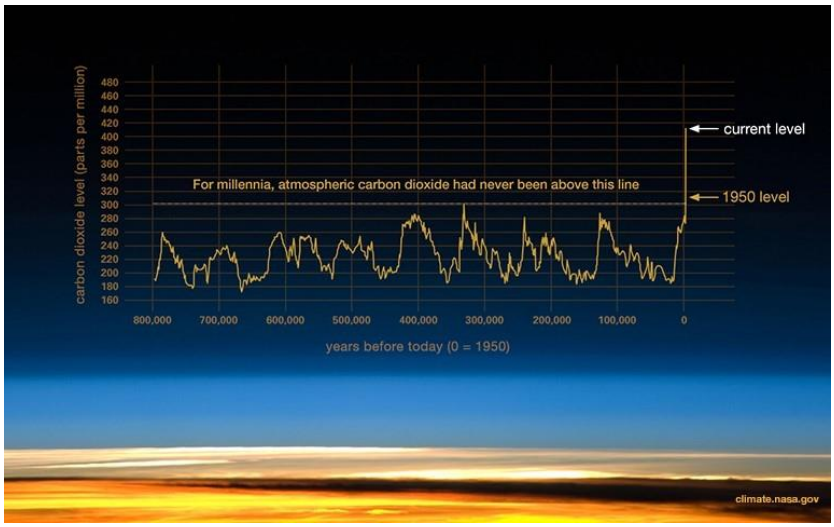
Radiation
The emission of energy as electromagnetic waves or as moving subatomic particles, especially high-energy particles which cause ionization. It has a form of ionizing or atomic radiation. Ionizing radiation is radiation with enough energy so that during an interaction with an atom, it can remove tightly bound electrons from the orbit of an atom, causing the atom to become charged or ionized.

Sustainable Development Goals
The Sustainable development goals are a set of aims, adopted by the UN and agreed by all UN member states in 2015 to end poverty, keep the planet safe and to allow all people to enjoy peace and affluence until 2030. They are also known as the "Global Goals".

General Overview

Climate Change and Global Warming Throughout the Years:

The increasing proliferation of deforestation, industrialization, and agriculture on a large scale have resulted in the accruing stages of greenhouse gas emissions. It is scientifically established that the concentration of GHG (greenhouse gases)'s is proportional with the average global temperature on the Earth's surface; beginning from the industrial revolution the concentration of these gases has been gradually increasing and so is the temperature worldwide; and the most common fossil fuel a result of burning fossil fuels is carbon dioxide, which has increased as seen in the graph below.



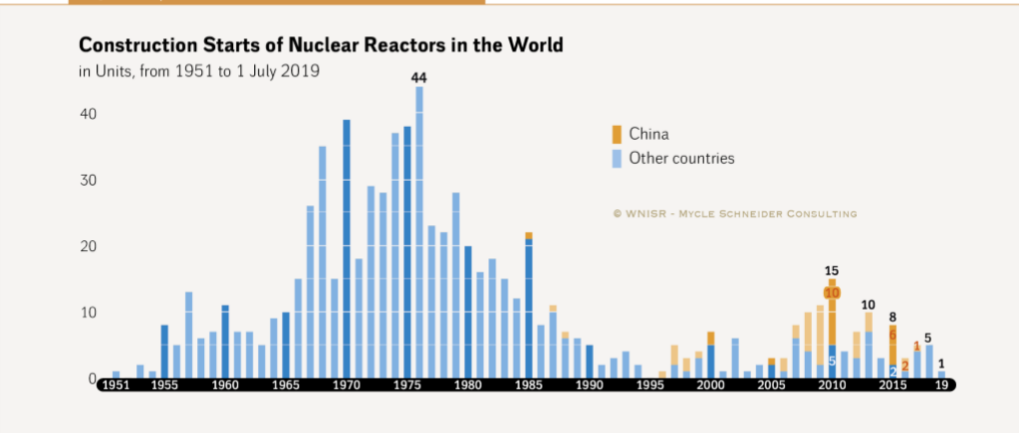
(a graph on the CO2 level from 800,000 years ago to today.)
According to the IPCC's (International Panel on Climate Change) 5th Assessment Report, climate change is caused by humans, later resulting in the enhanced greenhouse effect; and is real.
history, the current situation and where the problem comes from.

Fifth Assessment Report:

The report conducted by the IPCC includes a thorough observation on the sea-levels rising, its causes and effects; growing CO2 emissions starting from pre-industrial times, and furnishes a CO2 budget for the following emissions in order to decrease the overall temperature increase to under 2 degrees Celsius. Until 2011, approximately half of its maximum amount has been emitted. The report provides statistical information. These include information such as; the average global temperature of the Earth being risen from 1880-2012 by 0.85 degrees; the oceans warming and expanding due to warming and the melting of ice, resulting in 19 cm rise in the average global sea level from 1901-2010. It has further concluded that from 1979, the Arctic ice has melted in every 10 years by a 1.07x106 km2 loss. If the greenhouse gas emissions increase, then the global temperature is expected to increase higher than the pre-industrial level. The average sea level rise has been expected to increase 24-30 cm by 2065 and 40-63 in 2100 throughout a period from 1986-2005. However, the severe effects of climate change are still predicted to increase even if the emissions come to an end. These points

can be proven by other evidences such as the Amazon Rainforest fires that took place in Brazil in August 2019. These miscellaneous ecosystems of the Amazon and the Arctic Tundra may be affected by the warming and drying of these natural habitats. The melting of mountain glaciers and urgent driest months requiring the reduced water supply are predicted to have consequences by the surpass of multiple generations. To maintain a more stable climate, global net human-caused emissions of C02 would need to reduce by a total of 45%. this decrease would need to be reached from 2010 to 2030 step by step to attain a net-zero emission by the year of 2050. Therefore, the emissions persisting would have to be brought to a constant and equal level of CO2. However, the use of nuclear power would stimulate the balancing of CO2 in the air.

Figure 12 | Construction Starts in the World/China

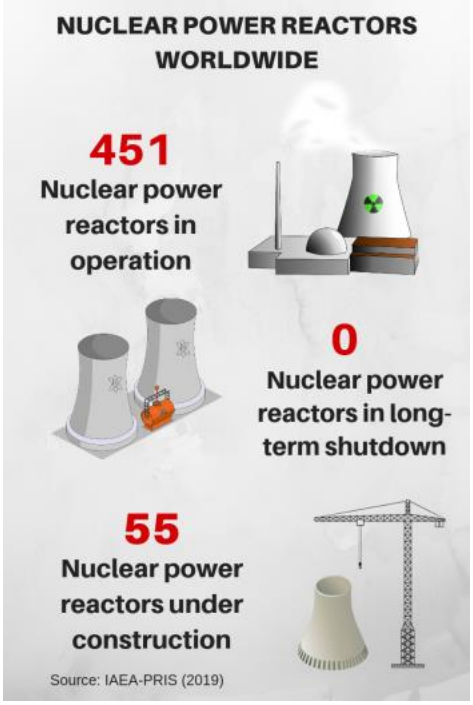


(a graph on the construction of nuclear power plants throughout the years.)

Nuclear Power and Climate Change

Advantages:

Nuclear power is an energy source which emits the least amount of greenhouse gases while also producing electricity. Nuclear power is considered to be a vital contributor in depleting the emission caused by GHG's and completing the need for the increasing energy needs of a growing population while also attaining the Sustainable Development Goals. Using nuclear power plants have advantages and disadvantages. As an advantage, nuclear power plants fabricate nearly no GHG emissions or air pollutants, that can be observed while working. Additionally, they emit very low concentrations of carbon dioxide, resulting in approximately 2 billion tonnes of CO2 emissions being refrained from. This is analogous to 400 million cars being removed from the streets.

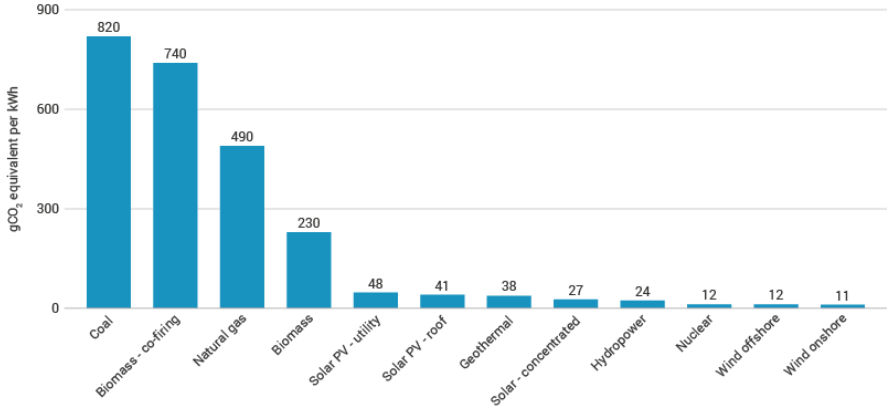


From December 31 2018, 30 countries globally have utilized 451 nuclear reactors in order to generate electricity. They have further started the building of 55 new nuclear power plants. As a result, 2018 ended with 13 countries generating half their electricity by nuclear energy. Countries such as France, Slovakia, Hungary and Ukraine have been using more than half of the nuclear power manufacture of their total electricity.

(a statistic on nuclear power plants globally.)

Disadvantages:

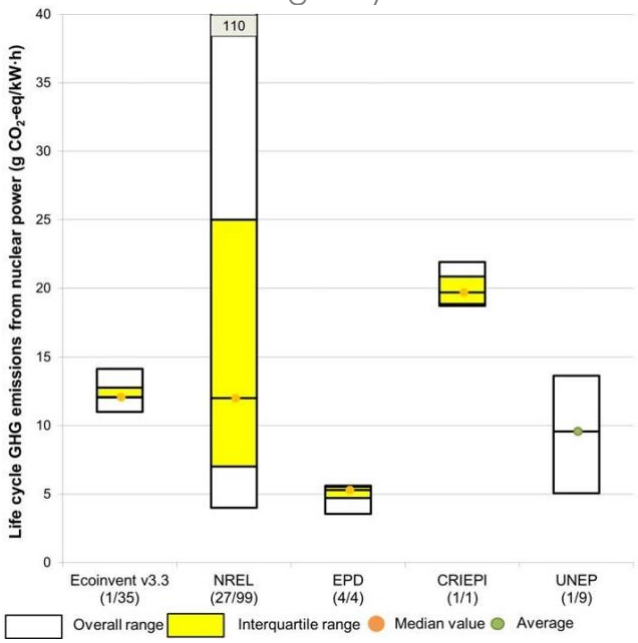
Despite the environmentally friendly advantages of nuclear power, all countries that are involved in manufacturing nuclear technology must take nuclear safety under consideration. Organizations like the IAEA (International Atomic Energy Agency), aim to persist in establishing a strong, visible, and sustainable global nuclear safety and security substructure by the help of the Department of Nuclear Safety and Security. This helps to protect the environment, society and people from any type of safety concerns arising from the use of nuclear power. This constitution further provides coordinated evolution and application of these safety methods by preparing instructions. However, the application of these methods doesn't have to be commanded within countries.



(Average life-cycle of CO2 equivalent emissions)

Nuclear Power Plant Incidents:

Throughout history, two accidents have had disastrous effects.
These are the Chernobyl and Fukushima incidents.
Chernobyl: The incident occurred in 1986 after the power plant in Ukraine was annihilated as a result of a faulty designed reactor which was facilitated by insufficiently trained personnel. The UN provided emergency support, by outlining nuclear safety and environmental conditions in the region where the incident happened. The IAEA provided support to those who were exposed to ionizing radiation.
Fukushima: After the 2011 Earthquake with a magnitude of 9.0 damaged east-Japan with an ensuing tsunami, the Fukushima-Daiichi nuclear power plant was extremely damaged. Thousands of people were evacuated from the area in which radioactive material was being released. The IAEA acts immediately upon the contaminated area, providing a team consisting of nuclear experts, emergency response, and radiation protection by the IAEA's Incident and Emergency Centre.



(a graph on the lifecycle of GHG emissions from the nuclear electricity generation)

Health and Environmental Concerns:
Humans are being exposed to radiation by nuclear power generation, the production of radioisotopes for both medical and industrial use along with the mining and manufacturing of wastes and ores. However, in incidents like Fukushima, the 20000 casualties were caused by mainly the tsunami and earthquake while less were caused by radiation exposure because the exposure in the accident was correspondent with the global average background of radiation.

Greenhouse Gas Emissions from Nuclear Power:

Nuclear energy along with other renewable energy sources produces zero-carbon electricity. Nuclear power plants, solar panels, wind turbines are some of the very few technologies which don't emit greenhouse gases into the atmosphere. This doesn't necessarily mean that these structures emit a total of 0% greenhouse gases. During their production and their functioning stages of their life cycles and the manufacturing of fuel and the nuclear fuel along with withdrawal incidents, a certain amount of greenhouse gases are emitted. In order to make a subtle analysis of the prevention of climate change, the nuclear fuel cycle must be known.
The Environment Product Declarations have come to the conclusion that the 50 percent of these emissions from plants such as come from Vattenfall Forsmark is reached because of mining, granulating and the enrichment of these plants. As seen from the graph above, when a regulated system of methods is used, greenhouse gas emissions produced from nuclear energy differ in a smaller range. The lowest levels of greenhouse gas emissions per unit of electricity are emitted by nuclear power. As the technology increases, it is estimated that the carbon footprint of nuclear power will decrease even more.

Desalination and GHG Emissions:
Furthermore, as only 3 % of the worlds water sources are freshwater, seawater desalination is vital. As stated by the IEA (ınt. energy agency), by 2040, the electricity generated with a 16 percent value around the Middle East will be used as a water supply. As stated by the Global Clean Water Desalination Alliance most desalination plants operated worldwide are using fossil fuel energy resources, emitting approximately 76 Mt CO2 each year. By the year of 2040, these emissions are predicted to increase to 218 Mt. It is proven that using nuclear power plants and therefore nuclear power may decrease the CO2 emissions in significant values.

GHG Emissions and Nuclear Power:
The approximate value of GHG emissions in 2030 should be 36.5 Gt CO2-eq, 19 Gt CO2-eq to maintain a lower temperature limit of 1.5 Celsius. GHG emissions are not expected to increase rapidly before 2030 according to nationally determined contributions(NDC's). The Paris Agreement, which is considered to be a previous attempt has several ways to find possible solutions to overcome climate change. However, agreements like the Kyoto Protocol have not considered the use of nuclear power since the enactment time to accumulate necessary amounts of carbon credits to make a notable investment was too short. Despite this, in the case of the Paris Agreement, nuclear energy was considered to be a vital source that could reduce the emissions and keep the average temperature increase under 2 degrees by the help of affordable low carbon energy throughout the years and lend both economic developments while strengthening the sustainability in addition, for all participating countries. The Paris Agreement will further be explained in the previous attempts.

Major Parties Involved

International Atomic Energy Agency (IAEA)
The IAEA, enforced on July 29th, 1957, is an independent international organization under the United Nations system. It provides the secure, peaceful and safe use for nuclear technologies such as power plants. While doing this, the IAEA works with its member states. The organization further educates and helps other countries that are interested in manufacturing nuclear power, with information. It further assists both environmental, sustainable, economic and energy policy establishments to countries. The establishment also is supporting countries to negotiate the 17 Sustainable Development Goals until 2030, by the help of the UN. The use of nuclear power for several requirements such as energy, health and food production, seawater desalination supports the use of 9 of the 17 SDGs.

United Nations-Intergovernmental Panel on Climate Change (IPCC)
Instituted in 1988, the IPCC is a body of the UN, which evaluates the science behind climate change. It was established in order to lend scientific observations and information on climate change, its causes and effects, along with its potential damage in the future, and to furnish possible solutions to alleviate climate change in the future. As the IPCC is created under the UN and the WMO it has 195 member countries supporting its reports and solutions. It further writes reports on every aspect of climate change, its risks, and cause/effects. Recently, the IPCC joined the IAEA and NEA to discuss the need for nuclear power in combating climate change.

Nuclear Energy Agency (NEA)
It is an intergovernmental agency under the OECD (organization for economic co-operation and development,) which calls upon countries with developed nuclear technology to work together to provide nuclear safety, technology, science, environmental and lawful solutions. Many of its aims are the same as the IAEA. It further aims to outline the environmental, social, economic uses of nuclear power along with outlining its safety. It further invites nations to work on nuclear energy power regimes, low carbon policies and sustainable development. It is consisting of 33 member countries.

World Meteorological Organization (WMO.)
The WMO, provides sufficient information on the climate and weather, along with their changes and differences. It further contributes to national meteorological and hydrological systems, marine oceanographic and space agencies, along with operational and research institutions. It is an international agency which supports climate scientists and their knowledge.

UNEP (UN ENVIRONMENTAL PROGRAM)
The UNEP works on both addressing the environmental facets of SDG's, while also establishing programs for climate change. It further works on GHG emissions and their effects, by writing annual Emission reports. The

establishment works with the WMO to deliver high-quality information on climate change and its policies by contribution to IPCC and IAEA.

Timeline of Key Events

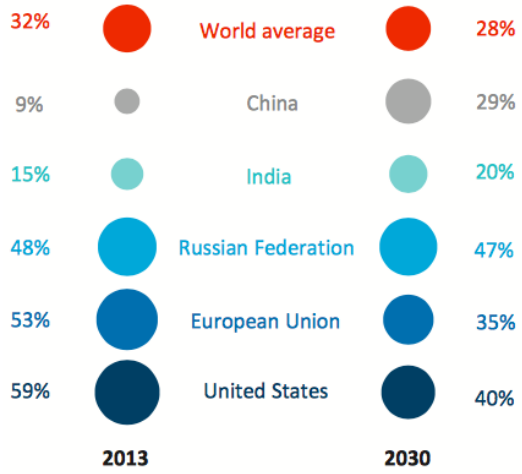
March 23, 1950,	WMO established
July 29, 1957	IAEA established
June 5, 1972	UNEP was Established
April 26, 1986,	Chernobyl disaster
1988,	The IPCC was Formed
1992,	The UN Framework Convention on Climate Change was ratified in Rio de Janeiro.
December 11, 1997,	the Kyoto Protocol
March 11, 2011,	Fukushima Daiichi
2014,	The IPCC establishes their Fifth Assessment Report on Renewable Sources
November 4, 2016,	Paris Agreement
September 23, 2019,	Climate Summit led by the UN Secretary-General, Mr Guterres

Previous attempts to resolve the issue

The Paris Agreement:
In 2016, 175 countries that are also a part of the UN Framework Convention on Climate Change signed the agreement which aimed to maintain a temperature below two degrees Celsius, without altering the functioning at pre-industrial levels. Furthermore, the agreement has called upon all countries to use nuclear power in the mitigation of climate change. The main aim of the Paris Agreement is to reinforce the global response to the severe damages and threats of climate change by maintaining a value under 2 degrees to 1.5 for the global temperature rise in the 21st century.
Today, 186 countries have endorsed the Paris Agreement. However, since MEDC countries like the United States of America are withdrawing from the agreement, other LEDC's are also starting to withdraw.

Images on Nuclear Power and Sustainable Development Goals, along with the Paris Agreement:

Figure 8. Focus areas for nuclear power in helping to achieve the UN 2030 Agenda for Sustainable Development Goals.



(the contribution of nuclear energy to low-carbon electricity production for the 2 degrees goal, for countries who have signed the Paris Agreement (2013))

As mentioned in the Paris Agreement, nuclear power can contribute to the low emissions and therefore support the treaty's 2 degrees C goal along with the SDGs. The Paris Agreement's motivation for economies to decarbonize is a chance for the nuclear power industry to enhance. Therefore, it is expected from countries to show their full support and act now.

2019 Climate Action Summit:

Along with the Secretary-General, world leaders, activists, the civil society were brought together to support multilateral processes and to escalate the action taken towards climate change. This summit had some main focuses such as nature-based solution (renewable energy sources such as nuclear power), heavy-industry, energy, climate finance and pliability. In the closing, Mr Guterres addressed that "You have delivered a boost in momentum, cooperation and ambition. But we have a long way to go. We need more concrete plans, more ambition from more countries and more businesses. We need all financial institutions, public and private, to choose, once and for all,

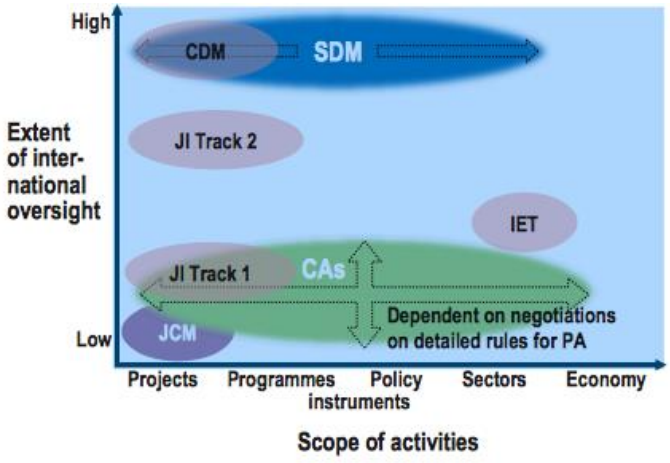
the green economy." Therefore, this meeting was vital in terms of using nuclear power in the fight against climate change.

Possible Solutions

To develop a set of solutions for the issue, it is required to consider the advantages and disadvantages of the solution. As a starter, agreements like the Paris Agreement may have been successful in the beginning however after major countries like the USA have decided on a withdrawal, other countries which produce more waste than most of the world have also considered on neglecting the aim of the agreement. This shows that sustainability is essential to create long-term agreements. Therefore, more economically developed countries should inspire less economically developed countries to support agreements like the Paris Agreement and the Climate Summit.

Furthermore, as some countries are developing new technologies from nuclear power, generation-reactor technologies may be used in order to provide safety and non-proliferation. Since the power plants would not require any cooling system to fight in case of an accident, and since they wouldn't need to be refuelled, the risk of explosions from radioactive materials such as Uranium would also be decreased.

In order to fulfil the aim of reducing carbon emissions, it is important to support and establish more projects such as the Sustainable Development Mechanism which aims for the mitigation of climate change and the use of sustainable development goals, which also consider nuclear power as a solution option in 9 out of 17 clauses. However, it is vital to make these long-term results to obtain more reliable results to use nuclear power as a low-carbon source in the fight against climate change. (Image- the SDM and other mechanisms adopted after the Paris Agreement)



Appendix/Appendices

- NEA Annual Report- https://www.oecd-nea.org/pub/
- Nuclear Power and Market Mechanisms under the Paris Agreement.- https://www.iaea.org/sites/default/files/np-market-mechanisms-under-paris-agreement.pdf

- Article on Nuclear Energy and Climate Change- https://www.world-nuclear.org/nuclear-basics/nuclear-energy-and-climate-change.aspx
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