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PHASING OUT OF NUCLEAR ENERGY SECTOR BY GERMANY – THE NEED FOR THE SAME IN INDIA

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ABSTRACT

Climate change is presently the talk of the globe. The rising of the global temperature above the predestined levels being mentioned, is affecting every form of living and non - living beings. To ensure life sustenance created by Carbon dioxide (CO2) the mitigation and reduction of the same gaseous substance is required. This is being mandated and countries are working irrespective of their levels of development since the very first international environmental convention, the Stockholm Declaration, 1972. The Stockholm agreement mandates the member nations to innovate more energy technologies that could help in the mitigation of climate change. With respect to this renewable energy technologies were found and are in use with many innovations being made to reduce the cost simultaneously increasing the output. As a part of the clean energy transition to meet the targets set out by the member nations in the Conference of Parties 26 (COP 26), many countries came forward to adopt nuclear energy as a source of clean energy owing to the characteristics of clean energy it possesses, including India, China, many Asian and western countries. But Germany, being one of the earliest founders of nuclear energy, has withdrawn itself from the list of nuclear energy states. This is due to the negative sides of nuclear energy and its impact it has already created. The purpose of the study is to evaluate the dependability of the nuclear energy sector in the fight against climate change. This paper will address a brief about nuclear energy, the reasons why Germany withdrew itself from the nuclear energy race and whether India should rely upon the energy sector in lieu with the targets set in the COP 26 meeting.

Keywords: *Climate change, COP 26, Nuclear energy, Renewable energy, SDG & Right to Life.*

INTRODUCTION

Humans must be aware of the fact that they are just residents in this globe and they don't own it. They're merely tenants who are paying to live a life alongside other living and non - living beings. The world that we're living in has given us a lot of things with just one thing in return to be done, enjoyment of its resources without damaging its beauty. But, this simple thing is not being done. The result of which the globe has turned into a bowl of hot fire. The effects are being seen day to day in the name of climate change effects. Carbon dioxide (CO2), which happened to be the main element which made life possible on earth, has now turned the other way around. We should be worried about it, because it's a man - made process

now, which started from the early 1800's. The natural process of global temperature rise and cooling of the same, changed into an anthropogenic activity, due to excessive emission of greenhouse gasses. We can say the modern era of human civilization started with the industrial revolution. This happens to be the very concrete of everything that we are enjoying now. But the same led to the worst World Wars I & II. The greed of a few powerful people, to expand their nation's borders and disturbing the peace and harmony of the other nation by way of draining out the natural wealth resulted as a part of industrial revolution. All these led to the increase of the CO2 in the atmosphere, which marked the beginning of degradation of the environment, making the natural process of turning up the heat and cooling down an anthropogenic activity (IPCC, 2021).

Environment as defined under the Environment Protection Act, 1986 is, "Environment includes water, air and land and the inter – relationship which exists among and between water, air and land, and human beings, other living creatures, plants, micro – organism and property" (India Code, 1986). It can be clearly understood that, environment is a complex thing which includes every sector of living and non – living beings, and that humans are interlinked with every organism that exists around him and dependent on it to live. But humans as stated earlier has not made it easy for mother nature to support us in this aspect. He's made it possible to make an ozone hole by increasing ozone depleting substances like; Carbon dioxide (CO2), Methane (CH4), Nitrous oxide (N2O) and Industrial gasses such as; Hydro Fluoro carbons (HFCs), Per Fluoro Carbons (PFCs), Sulfur Hexafluoride (SF6), Nitrogen trifluoride (NF3) (U.S. Energy Information Administration, 2022). In short, they're called greenhouse gasses. These gaseous elements trap the heat escaping to the atmosphere from the surface of the earth. These substances make the ozone layer weak and also increase the global temperature, leading to global warming. Effects of this act are seen visibly such as the heat wave we're experiencing, the melting of glaciers, sea level rise, degradation of agriculture, depletion of groundwater level and the list goes on. Even many diseases that are being spread as a result of it (United Nations).

To control it, global world leaders came together to mitigate climate change and ensure life sustenance. Initially the awareness or knowledge about it wasn't present much. But with the very first photographs of the earth being taken from space called earthrise, sparked the concerns about global level environmental protection. It was because the earth was seen brown and blue indicating the dry lands and ocean cover instead of green and blue (Poole et al., 2023). This led to the very first International environmental conference called the United Nations Conference on Human Environment, held at Stockholm, Sweden, 1972, formally called the Stockholm Declaration (Stockholm Declaration). The global leaders had one main problem or concern that was laid before them, climate change, which is the change in the weather patterns and temperatures that have been present for a long time (NASA) and reduction of greenhouse gasses. So, to tackle this major issue which leads to every form of life degradation, the Stockholm declaration happened.

This declaration is the first of its kind which discussed the environment as a major issue. The declaration consists of 26 principles in it which talks about technological advancements being made to eradicate the issue of climate change. The cooperative principle where states must come forward and cooperate within themselves for the better good (United Nations, 1972), the state sovereignty principle where the state can enjoy its own natural resources (United Nations, 1972) associated with the principle of preventive measures and precautionary

principle where the state should act in accordance with moral responsibility that the enjoyment of its own natural resources should not affect the wealth or rights of the neighboring nations are two major principles that the declaration emphasized in its document. The declaration has defined environmental issues such as pollution, discharge of wastes including hazardous wastes (United Nations, 1972), management of non - renewable resources (United Nations, 1972), economic and social planning including settlement and rational planning (United Nations, 1972), and also ban on nuclear weapons (United Nations, 1972) as an important principle for the peace and security of the globe. It also spoke about sustainable development in a lighter note. This concept evolved into a major principle and was implemented in the World Commission on Human Environment and Development – Our Common Future 1987, formally called the Brundtland Report, 1987 as an important principle for the very first time. Subsequently it was added as a principle in the Rio Declaration, 1992, from then things changed. It led to the formation of Millennium Development Goals in 2000, containing 8 Goals to be achieved by 2015, including eradication of poverty (United Nations, 2000), women empowerment and gender equality (United Nations, 2000), also primary education achievement (United Nations, 2000) which are some major aspects apart from environmental concerns. But this couldn't be achieved owing to the differences between nations. Once more, the world's leaders convened in Paris, France, notwithstanding their differences. The result was the Paris Declaration, which said that all countries must take action to stop global warming to 1.5°C over pre-industrial levels. (United Nations). The Sustainable Development Goals were one of the conference's other outcomes (SDGs) (Katila, 2019). With 17 goals and 169 targets to be met, this replaced the previous MDGs. The SDG was framed to be accomplished by 2030 and was more or less identical to the preceding one. The Conference of Parties (COP), which has been held annually since the Kyoto Protocol was established in 1997, has replaced the Paris conference and forced nations to adopt and carry out these objectives at the national level through laws and policies. These goals are fundamentally based on the idea that all of them are interconnected, or twined together, such that reaching one requires also achieving the others. According to this, environmental sustainability encompasses all facets of human existence.

With the sole purpose to attain the SDGs, countries came forward with many opinions and plans. Which includes dependence on fossil - based resources for energy and other matters and phasing out the same from usage. One major goal they emphasized that must be achieved soon is the clean and affordable energy goal (United Nations, 2015). Transition towards clean energy or renewable energy sources for energy generation, include the same in their individual energy mix and increase investments in it. Also, they came forward with the opinion to adopt nuclear energy generation stating it to be the most competitive clean energy comparatively to other renewable energy sources. But with this being stated after the COP 26 meet, where nations presented their targets that they'll become Net Zero by 2070, Germany withdrew itself from the nuclear energy sector by shutting down the last three reactors in the summer of 2022, which it was operating owing to the ongoing Russia – Ukraine wars. This is due to the safety concerns of the people, having known of the nuclear accidents and the damages it could cause. Whereas, India being a developing country in the run of economics, it is investing more in the energy sector in issue. This study will try to address the reasons why Germany exited the energy sector and the need of the same to be done by India, with having alternatives with it.

RESEARCH METHODOLOGY

The nature of the study done is doctrinal in nature with the usage of primary and secondary sources available related to the topic. The primary resources used for the study include international conventions and national legislations and reports by national and international organizations while the secondary sources consist of articles, journals and other sources related.

Research Question

Three major questions that the study will be dealing with are:

1. Is nuclear energy dependable in the long run for mitigating climate change?
2. Does exiting nuclear energy happen to be a bad decision made by Germany?
3. Can India survive in the fight without nuclear energy dependence?

REVIEW OF LITERATURE

Mecklin, J, from the Atomic Scientists Bulletin, has written an article, ***The German Nuclear Exit: Introduction*** has given an interesting view on the exit of nuclear energy by Germany and also spoke on the Energiewende about it. His approach offers considered conclusions based on comparative discussions and analysis, various opinions state that people supported the phase out decision at large. In his article apart from stating the majority opinion he also states that the phase out was a long and planned national initiative (Mecklin, 2012, 6 - 9).

Sarkar.P, a researcher from the KIIT University, Bhubaneshwar, India in his article ***The Civil Liability For Nuclear Damage Act 2010 – A Comparative Study*** has given a critical study on the CLND Act, 2010. He has talked about the act's ambiguity about the operator of any nuclear reactor or facility located in the nation's obligation. Because of the liability issue, it examines the benefits and drawbacks of India's nuclear energy industry through an analysis of the 2010 Act. One cannot ignore the incidents of nuclear mishaps that have occurred. Liability concerns for any incidents that may occur in the nation must be clearly defined (Sarkar, 2017, xxii 235p).

Constitutional Recognition Of Right To Healthy Environment: The Way Forward Written *by* ***Normawati Binti Hashim*** describes the need and necessity of including the right to a healthy environment under the purview of Right to life. The author has expressed his view about the need of including right to healthy environment within right to life under Article 5 of the Malaysian constitution by comparing it with India's legislative framework and the way the Indian judiciary has interpreted and included right to live in a healthy environment within the purview of right to life under the ambit of article 21 of the Indian Constitution (Hashim, 2013)

A Review On Environmental Impacts Of Renewable Energy For Sustainable Development *by* ***D. Gayen, R. Chatterjee, S. Roy,*** speaks about achieving the facet of climate change by virtue of increase in renewable energy. To make clear on the need of renewable energy to mitigate climate change, they've also given the pros and cons of the renewable energy sector and have stated the urgent need from transition from fossil fuel (D et al., 2024, 5285–5310).

Power Generation From Nuclear Energy an article written by ***Valerie Faudon*** discusses the economics of nuclear energy. The author from his study he conducted to know about the economics underlying behind the implementation of nuclear energy, calls for the

permission to extend the lifetime of existing nuclear power plants to a safer extent and to create a market where the energy is used valuably and dispatched properly wherein safety is ensured ("Power Generation From Nuclear Energy," 2022).

Comparison Of The Performance, Advantages And Disadvantages Of Nuclear Power Generation Compared To Other Clean Sources Of Electricity by ***Jonatas F. C. Da Mata, Amir Z. Mesquita And Rieder O. Neto*** is another article where the authors here have conducted a comparative analysis between the renewable energy resources majorly available including solar energy, wind energy, hydro energy and nuclear energy. The main purpose of the study was to emphasize the need to transition from fossil fuel sources to mitigate climate change. The results of the study they worked on conveys that the reliance upon fossil fuel sources will be present globally for years to come unless huge investments are being made in implementing the renewable energy technologies into the energy sector. Also, generation of energy from the nuclear energy sector is found to be more dependable in comparison with other clean energy sources except that it requires more investment in technology and operational safety measures (da Mata et al., 2017).

The above literatures have spoken about the various aspects of nuclear energy, the need for the shift from fossil – sources of energy towards clean energy sources including nuclear energy as an important one, which the researcher here finds uncompromising owing to the drawbacks the atomic energy possesses. This study will work on why nuclear energy must be phased out in entirety in the near future.

Conceptual Framework of The Study

As stated earlier, the shift from fossil – based energy sources towards renewable energy is what 's required as of now in the battle against climate change. While talking about clean energy, nuclear energy is one that is being advocated more by the UN member countries. This nuclear energy is a form of energy released from the nucleus, the core of atoms, made up of protons and neutrons (Galindo, 2022). The atoms are tiny units that make up all matter in the universe and the energy is what holds the nucleus together. In the atoms lies a vast amount of energy, the power it holds together is called a strong force. The energy is harnessed in 2 methods; 1.) Nuclear Fission 2.) Nuclear Fusion. Currently the energy is harnessed by the nuclear fission process, which involves the splitting up of atoms to produce energy. Water is usually used as a cooling agent, and the heat from the fission energy causes it to boil. After water is brought to a boil or is under pressure, the steam is directed into turbines, which spin and generate energy. Reactors that employ uranium as fuel, produce nuclear fission. As of now, this type of energy is defined as one that has the capacity to generate enormous amounts of energy. To mitigate the climate change happening, nations are aiming to invest more in nuclear energy, as it is considered to be the most efficient clean energy present as of now. Many climate activists claim that since carbon emission-free energy sources are needed both now and, in the future, this is a practical solution to address climate change. If this is the case, then why does a nation that was a leader in the energy field decide to shut down the entire industry within its borders? So, here arises questions about whether the energy is really a clean energy or not and why does Germany want to withdraw so badly.

Typically, clean energy refers to energy that is generated by facilities or sources that emit less to no greenhouse gas emissions which happens to cause climate change problems that

we are facing right now, during generation of electricity or power. The current complete growth of clean energy is crucial to easing the crisis created by non-renewable fuels like oil and petrol and to promote environmental protection. In the light of the Nationally Determined Contributions (NDC) given by each party in the COP 26 meet, clean energy transition plays an essential role. Clean energy production contributes in lessening climate change impacts by providing the energy we need without the greenhouse gas emissions and other negative environmental effects associated with fossil fuels. If we can reduce our carbon footprint and increase our reliance on clean, renewable energy sources, we will have a better chance of mitigating the effects of climate change and safeguarding our planet for future generations. The energy sector in issue, falls within the ambit discussed. Nuclear energy is termed as a clean energy as it emits less to no greenhouse gas, instead it emits only water vapors. Despite many people claiming it not to be a clean energy source, scientific experiments and researches have concluded that it is a clean energy source, from the start to the end of energy generation. It's nearly exhaustible like renewables. Apart from the discussion, there are three main reasons why nuclear energy is considered to be a clean energy. They are;

1.It protects the air quality by not emitting greenhouse gasses and also removes tonnes of dangerous air pollutants annually that cause smog, lung cancer and many other illnesses.

2.The carbon footprint is too small, with more energy being generated with less space.

3.The generated wastes are too small and can be recycled further (U.S. Office of Nuclear Energy, 2021).

Nuclear energy is also being declared as a green energy by the European Union in the summer of 2022 (Strauss, 2022). So, it's evident that nuclear energy is a clean energy source. But why does a country which is a pioneer in the energy sector withdrew itself from the energy sector, while it is required for the fight against climate change is a question to be discussed and answered upon.

The answer to the above question is the fear of life. Following World War II, Germany began developing nuclear power in the late 1950s, and the first reactors began to operate in the 1960s. In reaction to the increase in oil costs in the 1970s, Germany rapidly changed its nuclear energy strategy and energy system. But, following the Chernobyl accident, the policies started to wane. This is because the accident happened to be a worst disaster where considerable amounts of life was lost, and even now the place is in quarantine, where only researchers are allowed with high restrictions. Following the Chernobyl disaster, protests were made which is the main reason the country phased out nuclear energy. Be it the French revolution or the Black American revolution, or any other revolutions that history has recorded, it has been for a just cause. Not just for the sake of defending their own rights but also for the rights of future generations. In the same way, the citizens of the federal country banded together to fight for their cause and rights, and they succeeded. Following years of demonstrations against nuclear power plants across the country, prevented construction of new reactors in the country. The German Anti – Nuclear movement is a revolution that achieved its purpose by phasing out nuclear energy from the country. The right to life is the most fundamental right that is given to every person born in this world irrespective of their race, caste, class or any other forms of segregation. This was the main contention that the German Anti - Nuclear movement supporters stressed upon. With nuclear energy in hand, the right to life happens to be in

question, said nuclear energy opposers. This could be stated with accidents that are recorded in the past.

A. Hiroshima and Nagasaki Atomic Bombings, 1945

America's "The Little Boy and Fat Man" atomic bombs of Hiroshima and Nagasaki brought the Second World War to a close with the greatest loss of life and destruction to the environment. It didn't stop there, though. The sites still bear the scars from the bombardment. Lung, thyroid, breast, and other cancers continue to plague generations descended from the bombing survivors (International Campaign to Abolish Nuclear Weapons, 2017). Environmental harm is still evident today. Radiation is everywhere in this area, making it impractical for any kind of vegetation or livelihood.

B. Three Mile Island Accident, 1979

One of the earliest recorded nuclear accidents, which occurred in 1979 at U.S.A (United States Nuclear Regulatory Commission, 2024). The reports and studies indicate that fewer people have died and that health – related problems have not persisted as they did in the earlier one. Nonetheless, some are experiencing psychological stress as a result of the event even after ages.

C. Chernobyl Disaster, 1986

Considered as one of the worst nuclear incidents in history, the event took place in Chernobyl, located near the community of Pryp'yat, 65 miles (104 km) north of Kyiv (Anderson, 2024). The event took place due to workers mistake. This event resulted in large casualties, people were evacuated, still now due to high levels of Radiation being present in the place, the area is sealed. It is said that radioactivity several times more than Hiroshima and Nagasaki bombings was released into the atmosphere and was carried by wind as far as France and Italy infecting Belarus, Russia, Ukraine in the way. This radiation was also seen in the births given later by humans as well as animals which lived there, and still persists in way of cancer to the generations of the victims.

D. Fukushima Nuclear Accident, 2011

Humans were partially to blame for all of the aforementioned tragedies, but this is an exception. It was brought on by the tsunami that struck the plant's coastline (International Atomic Energy Agency). The 9.0 magnitude earthquake that caused the tsunami breached the defenses of the Fukushima Daiichi Nuclear Power Plant, which is situated in the village of Okuma. As a result, the systems failed and a catastrophe struck. Despite being evacuated, many still won't go back to their homes because of the radiation levels there. The maritime environment and marine life surrounding the plant clearly showed signs of radiation exposure.

These four instances from history provide a sufficient warning of the potential harm to humanity. Even after a few decades of the Anti - Nuclear movement, the government of Germany slightly turned their attention to nuclear energy generation, which the above accident made it to reconsider at high importance and made Germany initiate proceedings and plans to be sped up to phase out the nuclear energy entirely. They also made amendments in their Atomic Energy Act, 1959, in lieu with closure of the power plants in 2016. The very first provision of the act, talks about the purpose of the Act on the Peaceful Utilisation of Atomic Energy and the Protection against its Hazards (Atomic Energy Act), 1959, that the country must work towards phasing out nuclear energy entirely to ensure right to life (Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection, 1949).

The effects of nuclear accidents don't stop within humans, it extends to the entire surroundings. The International Court of Justice case, called the Nuclear Tests Case (Australia vs France) 1974, (International Court of Justice, 1973), is an example of the above statement, where the nuclear tests conducted by France were experienced in the coasts of Australia. This states the extent to which the radioactivity from nuclear energy can be seen. Apart from these there are other drawbacks that the energy sector possesses. The energy generation invokes high upfront costs to be invested initially and is much time consuming. Due to the complex nature of t, it requires high safety pre - cautions. The fuel utilized in the energy form is the next downside. Only found in the earth's crust, uranium ore serves as the fuel for modern nuclear technologies. This fuel is scarce and has to be made available through a laborious process. Due to the rate of consumption, experts predicted 10 years ago that the world's uranium stockpiles would last for only 80 years. As a result, nuclear energy is unreliable over the long term. Another disadvantage it has is the waste produced and the disposal of the used fuel rods. These must be handled carefully and disposed of properly in a way that it won't be released even in small amounts to the surroundings, adversely causing effects. As already seen, nuclear energy is uncontrollable. Nuclear energy has the potential to malfunction dramatically. Which causes another fear that if any accident happens, the radioactivity released as a result would stay in the atmosphere centuries put together. The spread of technology that could produce nuclear weapons is another concern about energy.

There are a number of international conventions and multilateral agreements made in light of the peaceful use of nuclear energy. All these conventions and agreements are divided into 4 categories.

1) Nuclear Safety and Emergency Response
2) Nuclear security, non - proliferation and nuclear safeguards
3) Environmental Protection
4) Liability and compensation for nuclear damages

Few of the very notable conventions regarding nuclear energy are;

i. Paris Convention On Third Party Liability in Nuclear Energy, 1960
ii. Vienna Convention on Civil Liability For Nuclear Damages, 1963
iii. The Non – Proliferation Treaty, 1968
iv. The Nuclear Test Ban Treaty, 1996
v. Treaty on the Prohibition of Nuclear Weapons, 2017.

The reason behind all these conventions being enforced is not only for peaceful use of the energy but to ensure that there occurs no more, 1945 Hiroshima and Nagasaki incidents in the future.

The Universal Declaration of Human Rights has stated the right to life as a fundamental right (*Article 3 in Universal Declaration of Human Rights)*. Our constitution also provides the right to life as a fundamental right (*Article 21 in Constitution of India*). Various interpretations have been done by the Indian judiciary and the apex court has stated that Right to life also includes Right to live in a healthy environment (AIR 1988 SC 2187). But with nuclear energy in hand this is in question. This was the main reason the nuclear country withdrew itself from the energy sector. In the case of M.C. Mehta v. Union of India (Oleum Gas Leak) (AIR 1987 SC 1086) case, the Apex court stated that, when an enterprise is involved in hazardous or dangerous activity and the result of which harm is caused to anyone by any accident in the

operation of the same, for example, resulting in the escape of toxic gasses, the enterprise is strictly and absolutely liable and subject to no exceptions under the rule laid in the Rylands v. Fletcher (1868, LR 3HL 330). Thus, the Apex court laid down the principle of absolute liability.

In another apex court case (AIR 1996 5 SCC 647), two major principles were introduced to India. They are; 1. The precautionary principle & 2. The polluter pays principle. Additionally, it emphasizes "sustainable development" to create balance between economic success and environmental preservation. This ruling is regarded as one of the most important ones for environmental preservation. It demonstrated that, despite the vital role that industrial growth plays in the nation's economic development, it is not tolerated at the expense of people's health and lives. These principles were also discussed in cases like Indian Council for Enviro - Legal Action vs Union of India (AIR, 1996 5 SCC 281). However, the Civil Liability for Nuclear Damages Act, 2010 itself stipulates that an operator shall not be liable in certain unusual circumstances. The 1962 Atomic energy act also the 2010, Civil liability for damages act doesn't give any necessary remedies under the act for any injury suffered or if any accidents happen. With this is in vague, having lacuna with the legislation proposed, promoting nuclear energy isn't a good option to choose.

CONCLUSION

The Indian government has stated that it will achieve Net Zero by 2070 (Ministry of Environment, Forest and Climate Change, 2022) in the COP 26 meet held at Glasgow, United Kingdom in 2021. In lieu with this the government has recently inaugurated nuclear power plants at Kudankulam – Tamil Nadu and Karapur -Gujarat. The Prime Minister opened the new fast breeder reactors in Kudankulam. But is it necessary is the question. India has a lot of renewable energy support naturally owing to the landscape it is in. It could make use of it and invest in it more. Germany after withdrawing itself with adequate planning and regulations they've increased the renewable energy generation and are now in the fight against climate change. Sustainable development talks about meeting the developments without causing any harm or damage to nature. That it is designed in such a way that developments are met in an accessible manner and are of the nature of longevity, while excluding the dangers and risks and promotes peaceful living along with nature. As a result, the transition away from nuclear energy to renewable energy is required. Australia, Austria, Denmark, Germany, Greece, Ireland, Italy, Norway, Serbia, and Poland are among the nations that have phased out nuclear energy and limited the development of new nuclear power facilities. So, investing in renewable energy sector which is dependable for the long run, such as solar, wind, hydro, ocean energies, would be a wiser option for attaining the targets set and also ensure that safety of citizens is maintained. With the current load of nuclear energy in the energy mix, it is hard for the nation to withdraw it, but it must do so constantly in the near future and should become a nuclear free nation.

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