

Nuclear Energy, Environment and Public Safety: North-South Politics

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ABSTRACT

While many believe that the biggest problems today are the world's struggling economies, the increase in terrorist cults, or growing populations, the greatest predicament concerns fossil fuel consumption, the resulting climate change and its repercussions. To change our patterns of fossil fuel consumption, key alternatives include fuel options such as renewable energy sources (e.g., solar or wind energy) and nuclear energy. As discussed in this article, renewable energy sources also have an environmental impact and are inadequate to totally meet the demands of an ever-expanding industrial civilization. Another alternative that many environmentalists are promoting is nuclear energy, which has been cited as the ultimate clean energy. At present, nuclear energy offers hope for an eco-friendly and economically-suitable energy option. This article argues that despite the challenges of public security, nuclear energy is a far better alternative than carbon-based fuels to promote sustainable development and protect against accelerated climate change.

INTRODUCTION

The greatest challenge facing the 21st century is environmental degradation and its damaging outcomes. Climate change is real, and so are its consequences. The environmental repercussions of fossil fuel consumption include climate change. As Shafiee and Topal have noted, fossil fuels have a crucial role in the global energy market, with the primary fossil fuel sources in the world being coal, crude oil and natural gas [1]. World population is increasing at an exponential rate, increasing the need for resources, such as industrialized goods and electricity. If current energy consumption patterns continue, the global oil

demand will only meet “peak supply between 2013 and 2020” [2]. It is apparent that the rise in global population and increasing development have substantially burdened our finite fossil fuel supplies. Not only is such development unsustainable, it is directly responsible for inducing climate change. Though the consumption of fossil fuel has in the past positively impacted economic development, the environmental costs of such development is a matter of grave concern [3,4].

Instances of environmental degradation due to the combustion of fossil fuels became apparent during the mid-1970's. The U.S. Clean Air Act set in motion the creation of the Environmental Protection Agency (EPA) to regulate the emissions of air pollutants that may reasonably be anticipated to endanger public health or welfare. This was among the first policies designed to reduce the level of toxic air pollutants. Since its enactment, the EPA has established several follow-up regulations to safeguard the environment and reduce the levels of pollutant gases. Among these was support for the Montreal Protocol in an effort to reduce the release of refrigerant gases which were determined to be responsible for the breakdown of the atmospheric ozone layer.

The levels of atmospheric carbon dioxide (CO₂) have been increasing and 2010 became the hottest year on record [5]. This was soon eclipsed by 2014 and again by 2015. Increasing levels of CO₂ in the atmosphere have devastating impacts on both the world's environment and its economy. The increase in global temperatures has caused environmental degradation leading to rising sea levels, increased pressures on wildlife and accelerated melting of the polar ice caps. At the rate global population is increasing, it is estimated that by 2050 there will be over 9 billion people living on the planet. This will cause demand for freshwater resources and agricultural goods to increase, thus challenging the Earth's capacity to fulfill such a huge demand [5]. To sustain Earth's life forms for the next few centuries, we need to use sustainable methods of development, those that are economically-viable and environmentally friendly. One possible alternative is to develop clean sources of energy that are sustainable and eco-friendly, as opposed to conventional carbon-based energy sources.

We are faced with a serious global issue: the sustainability of Earth and its inhabitants. Presently, 85% of the world's energy demand is being supplied by carbon-based, fossil fuels, in ever-dwindling supplies. The combustion of crude oil and other fossil fuels to meet our energy demands is responsible for emitting approximately 36 billion tons of

CO₂ into the atmosphere of which over 90% comes from fossil fuels. The oil which required 100 million years to form by natural process is being consumed in only 50 years.

To change our energy consumption patterns, alternative fuel options include renewable energy sources such as solar, geothermal and wind energy plus nuclear energy, another form of fossil fuel. As will be discussed in this article, renewable energy sources also have environmental impacts and are inadequate to meet the demands of an ever-expanding industrial civilization. The other alternative that many environmentalists are promoting is nuclear energy, which is being cited as the ultimate clean energy. Nuclear energy produces almost zero greenhouse gases, is fueled by a metal abundant in the Earth's crust, and requires less land resources than wind or hydro energy [6]. The major issues with nuclear power are concerns about development costs, safety, wastes and public security. The 1986 Chernobyl and the 2011 Fukushima nuclear disasters highlighted the concerns of public health impacts and security risks associated with the accidental release of radioactive materials.

Regardless, the world's population is facing an imminent energy crisis and immediate changes in energy infrastructure are needed. At present, nuclear energy offers hope for an eco-friendly and economically-suitable energy option. This article asserts that for sustainable development and protection against accelerated climate change, nuclear energy is a far better alternative than carbon-based fuels, despite its challenges.

THE DEVELOPING GLOBAL ENERGY CRISIS

The North-South divide focuses on the socio-economic division between the industrialized and more developed countries and the less developed and developing countries [7]. Basically, the Global North includes countries such as the United States, Canada, Western Europe, developed parts of Asia (Israel, the Four Tigers, Japan), plus Australia and New Zealand which are not located in the northern hemisphere. The Global South consists of countries located in Africa, Latin America, South America, and developing countries in Asia and the Middle East [8]. The more industrialized Global North countries hold 1/4 of the world's population yet control 3/4 of the world's income. The poorer

Global South countries are more politically unstable and generally obtain foreign exchange using primary product exports. Developing countries in the Global South are primarily located in sub-tropical or tropical regions; the developed countries of the Global North have mainly temperate and arctic climates [9]. Thus, the division between the North and South countries is based on their economies, political stability, technology, scientific research and other strongly persistent factors. Regardless of political and economic differences, environmental politics and safety, climate change, and types of energy production have become important issues in the context of North-South politics.

In global markets, fossil fuels are dominant as the primary energy supply sources, creating the potential for a serious energy crisis in the near future. While fossil fuels are finite, human needs and population growth seem infinite. There is a need to meet these threats for two key reasons: to mitigate climate change and to ensure a steady supply of energy for both developed and developing countries. The countries of the less developed southern hemisphere seem to be at the greatest risk for climate-induced natural disasters. For the growing economies and populations of third world countries, the developing energy crisis that results will be severe. Ironically, the northern hemisphere countries are contributing the most to climate change, despite having smaller populations than those in the southern hemisphere [10]. The nations of the North are emitting CO₂ at five times the per capita rate of the poorer nations in the South [11]. Thus, the northern countries are seen to be the primary cause of global warming. However, as the southern countries grow, countries like India and China have doubled, and in some cases, tripled their CO₂ emissions. Thus, setting equal carbon emission reduction goals is perceived to be unfair and unequal [11]. There is now a need for an energy supply that will provide both the Global North and South with enough power so that CO₂ emissions do not create such a huge barrier between these entities.

As Wolfe claims, even if the citizens of the Third World countries consume resources at one-third the rate of people in the U.S., there will be a "threefold increase in world energy" usage by 2050 [10]. If such demand for energy and resources is to be met, alternative fuel supplies must be considered so that carbon emission reductions can occur in an equitable manner. Why is this necessary? Wolfe explains that there are the obvious threats from air pollution, the rising costs of fossil fuels due to high demand, economic downfall resulting from low supplies of

fossil fuels, and the problem of global warming due to increased greenhouse gas emissions [10]. Others argue that perhaps the most understated problem relating to environmental change is that global climate change has the potential to lead to acute conflicts between nation states [12]. There might be a shift in power between the countries with the Global South demanding more resources and wealth than those in the North.

Dwindling land resources and increasing population have already led to climate-induced animal and human migration. Moreover, a decrease in crop production due to climate change also has the potential to increase conflicts within Third World countries, specifically in the rural areas [12]. The list of conflicts that will arise in the face of an energy crisis is never-ending, which is why alternate fuel supplies are required. Initially, the proposed plan was to shift from non-renewable fossil fuels such as petroleum and oil to renewable energy sources such as wind power and hydro-electric power. However, Beller and Rhodes have argued that there has been a "rise and decline" in renewable energy resources [13]. This is because of the high cost of constructing and operating energy plants using renewable energy sources. Coupled with the facts that solar power plants, wind turbines and hydroelectric power plants require large open areas, are geographically constrained and potentially provide insufficient energy to meet the required demand, renewable energy sources are proving to be inadequate to solely replace fossil fuels [14]. Perhaps the greatest concern regarding the renewable energy supplies is that there is an impact on the environment as well: the manufacture of certain types of photovoltaic cells produces toxic waste products that can cause environmental damage if not properly disposed with special technology [13]. With our existing energy sources contributing to climate change, there is now an acute need to further develop clean energy sources such as nuclear energy.

THE PROSPECTS OF NUCLEAR ENERGY

The very first nuclear generating plants were established in the 1960s and 1970s in the U.S. During this time, coal prices were high and legislation to limit levels of CO₂ were being considered. However, about 1974 the popularity of nuclear-powered stations began to decrease as concerns developed regarding public safety [15]. At present, there are

449 nuclear power stations operating in 30 countries, which provided 11% of the global energy production in 2014. There are also 60 new nuclear power plants under construction in 15 countries [16]. Of these, there are 61 commercial nuclear power plants with 99 operating reactors in the U.S. [17].

If climate change is to be tackled, the first step is to switch to an energy source that has the potential to provide electricity for the growing world population with zero CO₂ emissions. Nuclear energy is environmentally safe, affordable and probably the most practical choice of a clean fuel [13]. Nuclear energy emits negligible CO₂, zero emissions of sulfur and nitrogen oxides, and these are reasons it is considered to be the purest form of energy. The culprits behind the greenhouse effect are the increased levels of CO₂ and other greenhouse gases in the atmosphere. Increased levels of CO₂ trap the ultraviolet radiation in the atmosphere, creating a greenhouse effect which causes global warming and subsequent environmental degradation. Global warming can be tackled by replacing fossil fuels with fuel sources which do not release greenhouse gases. Another advantage of nuclear energy is that it is an efficient energy source, and can effectively replace carbon-based fuels. Uranium, which is the main fuel used to power nuclear power stations, is found in the Earth's crust. One gram of uranium can produce as much energy as one ton of coal or oil. Unlike fossil fuels, it is considered inexhaustible and has the potential to provide a nearly infinite power supply [6]. Though the construction and maintenance costs of nuclear power plants are substantial, the subsequent cost of energy production is reasonable. When the value of the power generated is compared with the costs of construction and maintenance, nuclear energy can be economically feasible, amortizing the initial construction costs [15].

NUCLEAR ENERGY'S ETHICAL DILEMMA

The reason that the subject of nuclear energy, despite its many advantages, is still broached with caution is due to the ethical dilemma regarding public safety. The main issue with nuclear power stations is that the uranium is radioactive and can produce disastrous impacts on human health. The two deadliest nuclear power accidents to date have been the Chernobyl nuclear plant disaster in 1986 and the Fukushima accident in 2011, which were both ranked as 7, the highest ranking of nuclear acci-

dents. In the 1986 Chernobyl accident, huge quantities of nuclear waste were released into the atmosphere and spread across Europe. The accident was responsible for the deaths of large populations of people and livestock. The longer-term effects include increased risk of cancer and birth defects. The second deadliest nuclear accident happened due to a series of natural disasters, ultimately resulting in the release of radioactive waste from the Fukushima nuclear power plant in 2011. Other such disastrous nuclear plant accidents include the Kyshtym disaster in Russia and the Three Mile Island accident in the U.S. [18].

Such accidents have damaging impacts on public health, food safety and the environment. Each raises the question of public security in the event of such accidents. Safety measures are not always followed properly. At the Fukushima nuclear power plant, it was revealed in a 2007 report that data regarding the safety checks was falsified, potential security threats were not addressed, and results were hidden so as not to disrupt operations [18]. To change the public perception of nuclear energy, concerns regarding safety must be the topmost priority. There needs to be a separate committee dedicated to proper oversight and maintenance of each nuclear power plant, so that public safety is less a concern when nuclear plants are established and safely operated.

THE GLOBAL NORTH-SOUTH NUCLEAR ENERGY DIVIDE

There is a major divide between the Global North and South regarding the regulation of CO₂ emissions. The highly developed Global North is the greatest contributor of atmospheric CO₂ emissions. Their economies have the latest technologies and are more stable than those in the third world. Therefore, the residents of the developed countries in the Global North are wealthier and have higher living standards. Alternatively, the developing countries in the Global South are the lowest contributors of the greenhouse gases, and their residents are poorer and have lower living standards. Given this difference in the contribution to greenhouse gases, there is a major debate about whether the global North and South should be equally responsible for tackling global warming. It also concerns what alternate fuel sources might be utilized in place of carbon-based fuels.

According to the North, the South should limit their emissions and learn from the mistakes of the North to avoid the economic and

environmental problems arising from unsustainable development. Conversely, the South has argued that the North is basically depriving the South of the opportunity to become developed and are using the issue of CO₂ emissions as a way to maintain a competitive disadvantage (North-South conflicts over environmental protection and resource management). However, there is no doubt that the South is developing in an unsustainable manner. The concern with this kind of development is that the South is developing in a manner which assumes that fossil fuel supplies are inexhaustible. If these supplies become exhausted, economic development in developing countries will be thwarted. Developing countries are more vulnerable to climate-induced change such as rising sea levels, which can also hamper development. If the impacts from climate change continue, there will be increases in the extreme weather events such as droughts, heat waves, and the frequency and intensity of monsoons which can hamper agricultural activities in developing countries [19]. Therefore, the developing regions of the South currently have greater need for alternate energy supplies than the North. One problem with applying nuclear energy in the South is that the technologies required to build, operate and maintain a nuclear power plant are very sophisticated. This is why countries such as the U.S., France and Russia have a greater number of nuclear power plants than countries in the South. This scenario needs to be changed as countries in the South become increasingly vulnerable. The Global North needs to share advanced technologies with the South so that more countries can enjoy industrialization and its resulting economic benefits without being placed at a competitive disadvantage.

NUCLEAR ENERGY IN BANGLADESH

While the use of nuclear energy in Bangladesh has been considered since 1961, the need for stable energy sources in Bangladesh has become urgent. Russia, China and South Korea have all considered providing technical and financial assistance to Bangladesh to construct nuclear power plants. About 30% of the country's population remains without any power, and almost 5% of the total national expenditure is for power and energy, mostly to purchase electricity from India.

In 2009, the Russian Federation formally proposed constructing two VVER-1200 nuclear power plants in Rooppur, Pabna. This proposal

was approved and the construction of the first plant began in late 2017 [20]. However, the estimated cost for the project increased from \$4 billion (USD) to \$13 billion. For nuclear energy to work in Bangladesh, several problems needed to be addressed. Since Bangladesh has a low capacity to maintain nuclear power plants and is unable to provide for the safety of its citizens, alternate fuel options must also be considered to mitigate the country's energy crisis.

While many solutions have been proposed by the government, such as plant rentals, barge mounted power plants, or buying electricity from neighboring countries, electricity demand has never been fully met, proving the unlikelihood that these might offer sustainable solutions. The construction of any new power plant will likely prove troublesome as the country lacks suitable land and may require people to be relocated. Thus, a suitable alternative for Bangladesh will be to establish power systems according to specific geographical locations and resources, known as distributed generation. In the north of the country, which experiences scorching temperatures, we can extract power using geothermal energy. In windy regions we can utilize wind energy. If nuclear energy proves to be unaffordable, we can develop other alternate energy forms to generate electricity and maintain our energy needs.

CONCLUSIONS

The environment needs to be protected for its intrinsic value. It has value in and of itself, independent of its use. I believe that we need to take action before the environment is irrevocably damaged. The need to protect the environment can also be seen from an anthropocentric point of view. It is a basic right of every individual to have an environment in which people can survive and prosper. Protecting the environment is of utmost importance. The greatest threat to the environment, the burning of fossil fuels, needs to be stopped to ensure that we do not further degrade the environment.

Nuclear energy has the greatest potential to replace the carbon-based fuels as it is environmentally friendly, offers a potentially infinite energy source, and is economically viable. Countries of the Global North, who are responsible for the majority of the greenhouse gas emissions, need to share technologies with countries in the South. Due to the radioactive nature of nuclear waste, there is a threat to public security.

Such concerns can be resolved if there is a global committee to assist with technology transfer, regulate safety measures, and mitigate threats related to nuclear power. There is the need for global governance to ensure that the Global South can operate nuclear power plants as cost-effectively as the Global North. The common goal should be to use nuclear energy for more sustainable energy development, sustaining life on Earth and the opportunities for future generations.

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