Nuclear Energy: The Way Forward

When humans the invented the steam engine, the world underwent an energy revolution. Eventually, man merged the steam engine with vehicles of transportation that resulted in ingenious machines such as trains and steamboats that made travel and life more convenient, a transportation revolution. The fuel for these revolutionary inventions was coal, a resource that was energy-efficient and easy to store and transport. A similar revolution occurred with the discovery of oil, an even more robust energy source that came to fuel virtually every convenience of life. Humans could power larger machines that could traverse land, sea, and air with oil. Furthermore, electricity, a convenient source of power for lights and other appliances was generated by the burning of these fuels. Yet the fossil fuels held grievous consequences. The combustion of fossil fuels contaminates the air with particulate pollutants which have adverse effects on local environments and human populations, and, perhaps more devastatingly, the release of greenhouse gases, chiefly carbon dioxide, that deteriorate the ozone layer. Nearly two hundred years of the widespread consumption of these fossil fuels has taken its toll on this crucial layer of the atmosphere that protects Earth from the Sun's radiation. The resulting warming of the planet, often called "global warming," is predicted to have irreversible, catastrophic consequences for all life on Earth. However, humans are too reliant on fossil fuel electricity to easily consider parting with them, even at the threat of calamity and mass extinction. At this point, the only remaining hope for humanity is a new energy revolution, and the best prospects lie in nuclear energy.

The term "nuclear" might make one think of the terrible destructive weapons employed during WWII and feared during the Cold War. However, the splitting of an atom of uranium yields immense energy that is now utilized most notably in the generation of electricity by

producing steam which drive electric turbines. The power generated is clean; the process only releases harmless water vapor into the atmosphere. This clean energy is also much more efficient than the electricity supplied by the traditional methods of burning fossil. Each 100 metric tons of coal can release the same amount of energy as around 28 grams of uranium (Amadeo).

Nuclear power does carry risks. The high-level waste produced as a byproduct of decomposing the radioactive materials that fuel a nuclear reactor are incredibly dangerous due to the strong radiation that is emitted. These materials have half-lives of hundreds of thousands of years and the radioactive potency does not diminish. The only disposal method of the waste material so far is storing it in expensive underground facilities; otherwise they are kept on-site near the reactors (Amadeo).

The risk of environmental contamination has been a concern amongst the public. Three Mile Island, Chernobyl, and Fukushima Daiichi are instances where compromised reactors released radiation into the environment, but the overall radiation released from each of these incidents had only benign effects on the larger environment and at best debatable effects on human health in those areas ("Backgrounder of the Three Mile Island Accident;" Lallanilla; Pearce). However, public opinion shifted sharply against nuclear power. As an example, after Fukushima Daiichi, Germany planned to phase out nuclear energy by 2022 with 10 out of 17 of its nuclear plants closed between 2011 and 2017 (Ritchie and Roser). That is not to say that these accidents were not dangerous. Facility personnel and rescue workers died in these incidents, and many more suffered health complications from exposure to dangerous levels of radiation. On the other hand, however, fossil fuels are estimated to have even higher death tolls compared to nuclear energy, and the death toll is likely higher than previously estimated (Ritchie

and Roser). Public misperceptions about the “dangers” of nuclear contamination through accidents has likely been one of the strongest inhibitors on the proliferation of nuclear power.

Whatever the shortcomings of nuclear power may be, they are nothing compared to the devastation that global warming could bring. The global warming trend is linked with notable rises in natural disasters that cause immense ecological, financial, and human damage. Heat waves, floods, wildfires, and drought are thought by many scientists to have higher probability or be exacerbated by global warming (Harvey). The increased severity and frequency of these events destroys environments and property, and endangers humans. Even more visible impacts can be seen below the ocean. The change in temperature has made corals more susceptible to bleaching events. Under certain conditions such as stress induced by temperature changes, corals will eject the algae living in their tissue that give them their vibrant luster and provides the organism with food and nutrients, bleaching them white. These events are occurring more often now with the advent of global warming. "We used to think bleaching happened once a century," said Dave Vaughan, a biologist at the Elizabeth Moore International Center for Coral Reef Research & Restoration in Florida. "Corals would have 100 years to recuperate," he said. "But then, there was one bleaching in the '70s, two in the '80s and now 12 in the last 14 years.” Half of the famous Great Barrier Reef died in 2016 and 2017, bleached in eerie white. Coral reefs provide food and shelter for 25 percent of marine life and support the diverse ecosystems that live on them. They also prevent up to $4 billion in tropical storm damage from flooding and generate $35 billion in tourism (Coffey). Losing coral reefs alone would be of great financial and ecological loss to the world. Meanwhile, humanity’s response has not been effective enough. The United Nations has set a threshold for rising temperatures, 1.5℃ higher than pre-industrial temperature averages. The next threshold is 2℃. At this point, the world is estimated

to experience sea level rise of an average of four inches, a mass extinction event, and virtually guaranteed extinction of coral reefs. Humanity is incredibly unlikely to reverse course in time to meet the 1.5℃ threshold, essentially guaranteeing catastrophic ecological destruction (Schlanger).

When discussing the impacts of climate change and global warming, there is no use in attempting to either downplay or exaggerate the facts. These consequences of humanity's environmental ignorance are challenges that must be faced with lucidity. The same applies to potential solutions to the crisis. When weaponized, nuclear power has proven its capacity for destruction and devastation unlike any seen before on Earth. Yet this same power now holds the key to the future of the planet. The use of nuclear power must be judiciously considered with the full gravity that this topic requires. When utilized wisely and cautiously, nuclear power has proven its beneficial capabilities with the efficiency and cleanliness of the electricity it produces. Nuclear power's use is not particularly widespread; it generates only 4.7 percent of worldwide electricity (Amadeo). However, if adopted on a larger scale, nuclear power can combat the decades of greenhouse gas emissions and pollution by humanity that now endanger the planet and form the cornerstone of the new energy revolution.

Although nuclear power has its serious risks, the fear surrounding them is often unfounded or overblown, and the clean energy provide the most feasible solution to greenhouse gas emissions. As humanity approaches closer to the point of no return for addressing global warming, the nuclear solution must be a key element in reversing our suicidal course.

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