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Nuclear Energy Should be Developed

Nuclear energy is the energy of the new age, known for its energy density and cleanliness. These advantages have made it popular in many countries, especially in developed countries like the United States, England, and Japan. A research shows that the nuclear energy contributes to 29% of all low-carbon power sources, making it the second largest source of such energy (Nuclear Power Today | Nuclear Energy - World Nuclear Association, world-nuclear.org/information-library/current-and-future-generation/nuclear-power-in-the-world-today.aspx.). Although nuclear energy is so popular, its development was quite controversial since nuclear power plant accidents could lead to devastating disasters. Thus, it is no surprise that both governments and the general public are hesitant toward nuclear power development. A research study conducted in the late 1970s found that a large portion of people believed that nuclear energy development was doing more harm than good to them (42%). Fourteen percent believed that nuclear power plants were beneficial, and the remaining population felt conflicted about the issue (Gamson, William A., and Andre Modigliani. “Media Discourse and Public Opinion on Nuclear Power: A Constructionist Approach.” American Journal of Sociology, vol. 95, no. 1, 1989, pp. 1–37. JSTOR, www.jstor.org/stable/2780405. Accessed 19 July 2021). Regardless of this opinion, the growth in the number of nuclear power plants in the last century alone has shown that the benefits of nuclear power plants have outweighed such concerns. The benefits of nuclear energy outweigh the risks because its efficiency, cleanliness, and steadiness.

The development of nuclear energy has a relatively short history compared to other clean energy sources such as solar energy, wind energy, or hydroelectric energy. The public was first introduced to nuclear devices towards the end of the Second World War, when the United States used nuclear weapons to bomb two cities in Japan. For most people, this was the first time the incredible power of nuclear energy was displayed, and the mass destruction witnessed left a strong impression. As a result, nuclear energy was linked to negative things such as war or death rather than positive things like productive force. After the war, nuclear energy industry was not in public view until the first nuclear power plant started its operations in Obninsk, Soviet Union on June 27, 1954. From the late 1970s to about 2002 the nuclear power industry was relatively stagnant. However, the prospects for nuclear power were revived by in the 21st century. As of 2020, there are 443 nuclear reactors in operation in some 30 countries around the world (Nuclear Power Today | Nuclear Energy - World Nuclear Association, world-nuclear.org/information-library/current-and-future-generation/nuclear-power-in-the-world-today.aspx.).

Harnessing nuclear energy as a power source was not without its drawbacks. One of the most serious nuclear power plant accidents is Chernobyl disaster on 26 April 1986. The Soviet Union has paid a huge price in responding to this crisis: the initial emergency response, together with later decontamination of the environment, ultimately involved more than 500,000 personnel and cost an estimated 18 billion Soviet rubles—roughly US$68 billion in 2019, adjusted for inflation. However, the majority of these efforts were in vain, and the result was tragic. According to a report by the USC Institute for Global Health, Director Jonathan Samet outlined the disaster’s financial costs. “The 1986 Chernobyl catastrophe that exposed some 10 million people to nuclear radiation in the surrounding countries has estimated costs of roughly $700 billion over the past 30 years, according to our extensive review of the literature.” Samet goes on to describe these costs in detail, specifically health. He says, “Health represents the largest proportion of the indirect costs. These costs greatly exceed those directly related to the plant because this price tag spans a lifetime and possibly even reaches to the next generation. Neuropsychological effects, such as depression, are among the most widespread and expensive of the long-term consequences.” (Samet, Jonathan M. Samet M, and Joann Seo. Review of The Financial Costs of the Chernobyl Nuclear Power Plant Disaster, USC Institute on Inequalities in Global Health, globalhealth.usc.edu) The Chernobyl catastrophe seriously damaged the Soviet Union not only economically but also politically. Numerous observers have blamed the Soviet Union’s entrenched propensity for secrecy and mendacity as the reason it failed to protect the health and safety of its citizens. Some have even gone so far as to assert that Chernobyl played an instrumental role in causing the collapse of the Soviet Union (Geist, Edward. “Political Fallout: The Failure of Emergency Management at Chernobyl'.” Slavic Review, vol. 74, no. 1, 2015, pp. 104–126. JSTOR, www.jstor.org/stable/10.5612/slavicreview.74.1.104. Accessed 23 July 2021.).

The Fukushima nuclear accident was another serious nuclear accident triggered by the 2011 Tōhoku earthquake and tsunami. Due to poor communication and delays in releasing data on dangerous radiation leaks at the facility, workers in the plant had no clear instructions on how to respond to such a disaster (Report: Japan, utility at fault for response to nuclear disaster". LA Times. 26 December 2011. Archived from the original on 23 January 2014.). Under such circumstances, the release of nuclear pollution was uncontrolled. One report written by Nuclear Energy Agency (NEA), the accident released 100–500 petabecquerels (PBq) of iodine-131 and 6–20 PBq of cesium-137 into the atmosphere, according to an estimate by the United Nations Scientific Committee on the Effects of Atomic Radiation. The International Nuclear Event Scale (INES) ranked the Fukushima accident at its highest Level 7. About 80 percent of the atmospheric releases were deposited over the ocean, and more of radioactive material was released directly to the ocean (Ryall, Julian (19 July 2012). "Nearly 36pc of Fukushima children diagnosed with thyroid growths". The Daily Telegraph). As an example of how radioactive material can harm humans, cesium-137, a radioactive isotope of cesium, causes serious damage the human body by combining with pancreatic tissue to cause to cancer. A screening program a year later in 2012 found that more than a third (36%) of children in Fukushima Prefecture have abnormal growths in their thyroid glands (Fukushima Daiichi Nuclear Power Plant Accident, Ten Years On". OECD Nuclear Energy Agency. 2021. p. 21. Retrieved 4 March 2021.). In addition, once these radioactive elements get into the soil and water, it is extremely hard to extract them. Without a way to remove the toxins, it is no exaggeration to call the polluted ground “dead land.” Such land cannot support farming nor grazing, even if the land does not appear any different.

Though there is a focus on the devastation that resulted from two nuclear accidents, is nuclear power really a demon that can only bring damage and death? Painting nuclear power as a demon is not realistic and is not the whole truth. Nuclear power brings a multitude of advantages if managed properly. Not only is it useful in generating mass amounts of energy in power plants, nuclear power is also used in astronomy: some satellites use nuclear energy travel to places where little solar energy can be obtained. Nuclear power systems function independent of sunlight, which is necessary for deep space exploration. Also, nuclear power systems are lighter than solar cells of equivalent power, allowing spacecrafts easier to direct in space. The Mars Curiosity rover is a great example of the usage of nuclear power in space exploration. With the help of a radioisotope thermoelectric generator system, it moves swiftly and steadily on Mars even if there is almost no sunlight ("Multi-Mission Radioisotope Thermoelectric Generator (MMRTG)" (PDF). NASA/JPL. October 2013. Archived (PDF) from the original on 26 February 2015. Retrieved 17 February 2021.).

The most common use of nuclear power is in generating electricity. Admittedly, nuclear accidents are dangerous and extreme. However, after the two major disasters discussed above, nuclear power plants have significantly improved their safety. Nuclear power plants provide large amounts of power with an efficiency significantly higher than that of regular power plants. According to the static provided by the United States Department of Energy (DOE), nuclear energy has by far the highest capacity factor of any other energy source and provides 1.5 to 2 times more as natural gas and coal, and 2.5 to 3.5 times more as wind and solar plants (Electric Power Monthly - U.S. Energy Information Administration (EIA), www.eia.gov/electricity/monthly/epm\_table\_grapher.php?t=epmt\_6\_07\_a.). Nuclear power plants also require less maintenance and are designed to have a longer operating life, usually 25 years or longer. A report from IAEA states that most of the nuclear power plants have operating lifetimes between 20 and 40 years (Stanislav Novak, and Milan Podest. “Nuclear Power Plant Ageing and Life Extension: Safety Aspects.” International Atomic Energy Agency, 2000, www.iaea.org/sites/default/files/29402043133.pdf.), and the lifespan of nuclear power plants could be extended depending on plants’ degradation of material and service conditions. Since 2000, there have been more than 60 nuclear power plants that have operated for 30 years, and the number of power plants exceeding 25 years continues to increase. This is a testament to the drastic improvement in the safety and security of nuclear power plant operation, which assures many that nuclear disaster is unlikely. Once a nuclear power is built, it continuously provides vast amounts of energy steadily at a lower price, which is obviously an ideal choice for long-term developments. Perhaps most important of all, nuclear energy is considered “clean energy” because nuclear power plants have zero emissions while generating power. Power is generated through fission, which is the process of splitting uranium atoms to produce energy. As there is no process of burning fossil fuels, there is no harmful byproducts which might pollute the air. Many have concerns over the disposal of leftover radioactive materials after a nuclear reaction, but many safety measures have been taken to ensure such material does not harm the public. For example, nuclear waste must be stored to avoid any chance of radiation exposure to people. The land footprint of nuclear power plants is also much smaller than other clean energy power plants such as solar panels. All of these features are why many countries welcome nuclear power as the energy source of the future.

In conclusion, although nuclear energy is dangerous, its advantages are outstanding and unique. Nuclear energy benefits humanity by providing energy in a clean manner. With this cleaner energy source, the planet’s atmosphere and ecosystems are protected. The catastrophic nuclear accidents in the past are not to be hidden away, but to be taken as incentive to improve the safety of nuclear power plants. Since the last major disaster, nuclear power plants have greatly improved their safety. From a practical standpoint, the energy production of nuclear power is far greater than any other method, which speaks to its utility. Nuclear power has already done so much for the present generation, and it will continue to change the world for the better in the future.