Reliability of Nuclear Energy

In times of crisis, access to reliable energy sources is essential. When disaster strikes, the complications attributed to power loss—food spoilage, barred access to hot water, uncontrollable indoor temperatures, and inability to cook—are intensified as roads may be inaccessible to residents in need of alternate sources of necessities. Hundreds of thousands of people in Houston, Texas and its surrounding areas were without power when the relentless Hurricane Harvey hit; roads were flooded, and inhabitants of the region were left utterly defenseless against the impending threats of depleted potable resources and hot water. A shocking 96.8% of Texas's energy sources are non-nuclear ("U.S. Energy"). If Texas utilized more nuclear sources for energy, this disaster's effects could have been significantly diminished. Hurricane Harvey's mass power outages remind the world that its non-nuclear power sources are feeble and unreliable. Reliable energy sources must be accessible despite unpredictable conditions and must be sustainable for many generations to come. Nuclear energy encompasses these aspects. Nuclear energy is a notably more dependable energy source than its non-nuclear counterparts because nuclear energy is the only energy source that is totally resistant to inclement weather; it has a much more copious, albeit finite, supply than many of its non-nuclear counterparts, and it causes drastically less pollution than alternate energy sources.

By design, nuclear energy is the only energy resource that will not be affected by extreme weather. Two units at the South Texas Project, a nuclear power plant about ninety miles southwest of Houston, "continued to operate at full power throughout Hurricane Harvey" ("Texan Nuclear") despite the harsh weather conditions. The buildings that house the reactors at the South Texas Project are fortified with steel walls, up to seven feet thick, that can not only resist any category tornado or hurricane, but also can endure a plane flying directly into them

(Conca). Certain safety protocols must be followed under these extreme conditions to ensure safety of the plant and continuity of energy generation. The South Texas Project is not unique in its having safety procedures; preparation routines for imminent threats are ubiquitous in nuclear plants throughout the United States. The plan for inclement weather specific to the South Texas Project beings with meticulously inspecting the site to "ensure that all equipment is secure and protected as possible" (Adams) and followed by "checking fuel levels for emergency generators" (Adams); the final step is to confirm that "a staffing plan is in place to cover all of the required tasks without external assistance for as long as necessary" (Adams). The site's safety protocol was implemented successfully during Hurricane Harvey, keeping the plant stable throughout the storm. Contrastingly, non-nuclear energy sources are not as capable of withstanding severe weather. Wind turbines must shut down when wind speed reaches 55 miles per hour (Orient), and solar panels cannot capture energy from the sun during storms due to cloud cover (Orient). The "aging infrastructure" (Rodman) of fossil fuel sites prevents their operation during tempestuous conditions. Nuclear energy sources are viable even in the most detrimental storm conditions whereas their non-nuclear counterparts are compromised in such cases.

A naturally-occurring element in Earth's crust, uranium, is the basis of nuclear power. The extensive abundance of uranium on Earth and its efficiency as a power source make nuclear power more dependable than alternate energy sources. As much as 6 million metric tons of uranium exist in Earth's crust ("Supply of Uranium"). One metric ton of natural uranium—after mining, enrichment, and fuel fabrication—produces 44 million kilowatt-hours of electricity, enough energy to power New York City for four days ("The Nuclear Fuel Cycle"). Incongruously, 20,000 metric tons of black coal would have to be burned to produce this much energy ("The Nuclear Fuel Cycle"). The viability of a resource is essential to a resource's

dependability; without steady access and incredible efficiency in its use, resources dwindle. With nuclear power, the threat of dwindling resources is much less grave than it is for fossil fuels. Though not yet implemented in the United States, France and the United Kingdom have honed the procedure of "reprocessing spent fuel" ("Can Nuclear"); reprocessing spent fuel separates the distinct radioactive elements in the waste accrued from nuclear power so that it can be reused. With an already impeccable efficiency compared to fossil fuels, nuclear power is now also becoming more renewable, a trait that fossil fuels lack. Coal, natural gas, and petroleum reserves are "a few hundred years" (Makhijani) from being depleted and are not used efficiently. Nuclear power's sustainability and availability distinguish it from its inefficient and finite non-nuclear power counterparts.

Energy sources that cause sizeable amounts of pollution are not reliable because they are not feasible; there is only so much pollution the world can handle. Because nuclear power is produced by fission instead of combustion, "no greenhouse gases or emissions associated with acid rain or urban smog" ("Protecting the Environment") are produced. Nuclear power has one of the lowest effects on the environment of any energy source. Discordantly, a multitude of non-nuclear energy sources produces considerable amounts of pollution. Coal combustion can harm the air, water, and land by emitting harmful materials like mercury, carbon dioxide, and sulfur dioxide ("Environmental Impact"). Hydropower sources harm fish populations by disrupting their ecosystems ("Environmental Impact"). Even geothermal plants have a negative impact on the environment; they release a small, albeit notable, amount of carbon dioxide and sulfur dioxide into the atmosphere ("Environmental Impact"). Although nuclear energy emits no carbon dioxide or harmful chemicals directly into the environment, it does leave behind radioactive spent fuel. This spent fuel, however, is stored safely "to prevent [it] from harming

the environment" ("Environmental Impact"), making nuclear energy an infinitesimal polluter. Energy sources that release copious volumes of pollutants into Earth's air, water, and land are not dependable resources; eventually, they will not be viable because of their highly toxic effects on the environment. Nuclear energy, on the other hand, emits only minute amounts of pollution into the environment, constituting it as a reliable and sustainable energy source for innumerable years in the future.

In the twenty-first century, energy use is integral to many life necessities; most people keep their food in a refrigerator to prevent spoilage, wash their clothes in a washing machine, and cook on electric stoves. Reliable energy sources are crucial to human life in this modern epoch. Because access to energy is necessary to accomplishing many of modern life's basic needs, energy must be readily available in times of unpredictable crisis and for centuries to come. The loss of power experienced by hundreds of thousands of people affected by Hurricane Harvey and the desperation it left them in for life's necessities underscore that reliable energy sources are needed to combat any possible instances like this in the future and to prevent the depletion of finite resources, such as coal and petroleum, that are overly used. Nuclear energy is more reliable than its non-nuclear counterparts because of its accessibility under any circumstances, immense abundance of resources, and lack of pollution. If implemented in place of nonrenewable, finite, polluting energy sources, nuclear energy could serve as a reliable energy source for millennia.

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