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 English 210
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Why the United States Should Adopt Nuclear Power

Thousands of studies conducted by scientists to measure climate change over the last one hundred years have accumulated substantial evidence that global warming is occurring unequivocally. According to the NASA *Earth Observatory* web site, greenhouse gas emissions caused the average surface temperature of the Earth to increase by 0.6 to 0.9 degrees Celsius between 1906 and 2006. If fossil fuel energy continues to be burned relentlessly, scientists are predicting that the average surface temperatures could rise between 2°C and 6°C by the end of the twenty-first century (Riebeek). A prevalent consensus among scientists is that humans are a major culprit in global warming by burning fossil fuels such as coal and petroleum, with coal-fired power plants being one of the major problems. Lately, discussion has focused on what governments in developed countries can do to tackle climate change.

One solution, advocated by scientist William Sweet writing for the magazine *Discover*, is that the United States should expand its long-ignored nuclear power industry. However, many people—especially environmentalists—are afraid of nuclear power and believe that we can solve global warming through other alternatives. Despite these fears and counter-arguments, I believe that Sweet is right about nuclear energy. The United States should as quickly as possible phase out coal-burning power plants and replace them with nuclear power and other green technologies.

Before we look at the advantages of nuclear power, it is important to see why many people are opposed to it. First, opponents argue that nuclear power plants aren't safe. They regularly cite the Three Mile Island accident in 1979 and the disastrous Chernobyl meltdown in 1986. A more exhaustive list of recent small scale but worrisome nuclear accidents is provided by an editorial from the *Los Angeles Times*, which describes how a July 2007 magnitude 6.8 earthquake in Japan "caused dozens of problems at the world's biggest nuclear plant, leading to releases of radioactive elements into the air and ocean and an indefinite shutdown" ("No to Nukes"). Opponents also argue that nuclear plants are attractive terrorist targets. A properly placed explosive

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could spew radioactive material over wide swathes of densely populated areas. Nuclear power plants also provide opportunities for terrorists to steal plutonium for making their own nuclear weapons.

Second, while agreeing that nuclear power plants don't produce greenhouse gases, opponents remind us that radioactive waste cannot be stored safely and that radioactive waste remains hazardous for tens of thousands of years. The heavy walled concrete containers used to enclose nuclear waste will eventually develop cracks. If the planned disposal facility at Yucca Mountain, Nevada—where wastes would be stored in concrete and steel containers deep underground—ever becomes operational, it would ease the waste issue for the United States but would not eliminate it. The dangerous nuclear waste would still have to be trucked to Nevada, and even the Nevada site might not be completely impervious to earthquake damage or to the possibility that future generations would dig it up accidentally.

5 Finally, opponents claim that nuclear power plants are extremely expensive and the process of building them is extremely slow so that this method won't provide any short-term solutions for climate change. According to the "No to Nukes" editorial from the *Los Angeles Times*, the average nuclear plant is estimated to cost about \$4 billion, making nuclear-generated energy about 25% to 75% more expensive than old-fashioned coal. At the same time, the regulatory process for building nuclear power plants is slow and unpredictable, making investors hesitant about supplying the capital needed. Opponents of nuclear energy argue that these high costs and long waiting period would make it impossible to launch a massive construction of nuclear power plants that would have an immediate impact on global warming.

So in the face of these risks, why should we support Sweet's proposal for expanding nuclear technology? One answer is that some of the fears about nuclear plants are overstated, fabricated, or politicized. It is true that in the past there have been accidents at nuclear power plants, but improvements in technology make such disasters in the future very unlikely. According to Sweet, changes in the design of nuclear reactors in the United States make them "virtually immune to the type of accident that occurred at Chernobyl in April 1986" (62). Furthermore, Sweet points out, the oft-cited Three Mile Island accident didn't injure a single person and led to a better regulatory system that makes new reactors much safer than old ones. According to Sweet, today's "coal fired power plants routinely kill tens of thousands of people in the United States each year by way of lung cancer, bronchitis, and other ailments; the U.S. nuclear economy kills virtually no one in a

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normal year” (62). In addition, management of power plants has improved. As for the fear of terrorist threats and nuclear proliferation, these concerns have been blown out of proportion. As Sweet argues, if any terrorists are seeking to produce bombs, their access to plutonium will not depend on how many nuclear power plants the U.S. is building. Because nuclear power plants must be housed within concrete containment barriers to prevent damage from earthquakes, hurricanes, and floods, they are also resistant to terrorist attacks. A study carried out by the Electric Power Research Institute and reported in a major study of nuclear power by scientists from MIT showed that an airplane crashing into a U.S. nuclear power plant would not breach the containment barriers (*Future of Nuclear Power* 50). Moreover, nuclear scientists say that the safe containment of nuclear waste is not a technical problem but a political problem.

Although nuclear reactors are not risk free, they are much safer for people’s health and for the environment than are coal-fired plants with their pollution-spewing greenhouse gases. According to the MIT study on nuclear power, since the first commercial nuclear reactor was built in the United States in 1957 (there are now currently 100 nuclear reactors in the United States), there has been only one accident that caused core damage (Three Mile Island). Using statistical analysis, the researchers estimate that the current safety regulations and design specifications will limit core damage frequency to about 1 accident per 10,000 reactor-per-years. They also believe that the technology exists to reduce the rate of serious accidents to 1 in 100,000 reactor-years (*Future of Nuclear Power* 48). The benefits of nuclear power for reducing global warming therefore outweigh the real but very low risks of using nuclear energy.

As to the problem of nuclear power’s expense, it is true that nuclear plants are more expensive than coal, but it is important to understand that the high initial cost of building a nuclear power plant is being compared to the artificially low cost of coal power. If we were to tax coal-burning plants through a cap and trade system so that coal plants would have to pay for social and environmental costs of pollution and production of greenhouse gases, nuclear power would become more competitive. As Sweet argues, we need a tax or equivalent trading scheme that would increase the cost of coal-generated electricity to encourage a switch from cheap coal to more environmentally friendly nuclear power plants.

Nuclear power plants are not the perfect or sole alternative to burning coal to generate energy, but they are certainly the most effective for combating global warming. Without nuclear power plants, we can’t generate enough electricity to meet U.S. demands

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while also reducing carbon emissions. There are other alternatives such as wind technology, but this is also more expensive than coal and not nearly as reliable as nuclear power. Wind turbines only generate energy about a third of the time, which would not be enough to meet peak demands, and the problem of building enough wind towers and creating a huge distribution system to transmit the power from remote windy regions to cities where the power is needed is overwhelming. Currently wind power generates less than 1% of the nation’s electricity whereas nuclear power currently generates 20 percent (Sweet). According to Jesse Ausubel, head of the Program for the Human Environment at Rockefeller University, “To reach the scale at which they would contribute importantly to meeting global energy demand, renewable sources of energy such as wind, water, and biomass cause serious environmental harm. Measuring renewables in watts per square meter, nuclear has astronomical advantages over its competitors.”

10 To combat global warming we need to invest in strategies that could make a large difference fairly quickly. The common belief that we can slow global warming by switching to fluorescent light bulbs, taking the bus to work, and advocating for wind or solar energy is simply wrong. According to science writer Matt Jenkins, the climate problem is solvable. “But tackling it is going to be a lot harder than you’ve been led to believe” (39). Jenkins summarizes the work of Princeton researchers Stephen Pacala and Robert Socolow, who have identified a “package of greenhouse gas reduction measures” (44), each measure of which they call a “stabilization wedge.” Each wedge would reduce carbon gas emissions by one gigaton. Pacala and Socolow have identified 15 possible stabilization wedges and have shown that adopting 7 of these wedges will reduce carbon emissions to the levels needed to halt global warming. One of Pacala and Socolow’s wedges could be achieved by raising the fuel economy of 2 billion cars from 30 mpg to 60 mpg (Jenkins 44). Another wedge would come from building 50 times more wind turbines than currently exist in the world or 700 times more solar panels. In contrast, we could achieve a wedge simply by doubling the number of nuclear power plants in the world. Nuclear power is clearly not the only solution to climate change. In Pacala and Socolow’s scheme, it is at most one-seventh of the solution, still forcing us to take drastic measures to conserve energy, stop the destruction of rain forests, develop clean-burning coal, and create highly fuel-efficient automobiles. But nuclear energy produces the quickest, surest, and most dramatic reduction of the world’s carbon footprint. If we do not take advantage of its availability, we will need to get equivalent carbon-free power from other sources, which may not be possible and will certainly be more expensive. Therefore

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expanded use of nuclear technology has to be part of the solution to stop global warming. We should also note that other countries are already way ahead of us in the use of nuclear technology. France gets almost 80% of its electricity from nuclear power and Sweden almost 50% ("World Statistics"). These countries have accepted the minimal risks of nuclear power in favor of a reduced carbon footprint and a safer environment.

In sum, we should support Sweet's proposal for adopting nuclear power plants as a major national policy. However, there are other questions that we need to pursue. Where are we going to get the other necessary wedges? Are we going to set gas mileage requirements of 60 mpg on the auto industry? Are we going to push research and development for ways to burn coal cleanly by sequestering carbon emissions in the ground? Are we going to stop destruction of the rain forests? Are we going to fill up our land with wind towers to get one more wedge? If all these questions make climate change seem unsolvable, it will be even more difficult if we cannot factor in nuclear technology as a major variable in the equation.

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Our second reading, by student Sandy Wainscott, illustrates Option 5, a proposal speech supported by visual aids. We have reproduced Sandy's outline for her speech, along with six of her ten PowerPoint slides. Her final slide was a bibliography of the sources she used in her speech. Note how she has constructed her slides as visual arguments supporting a point (stated in the slide title).

Why McDonald's Should Sell Meat and Veggie Pies: A Proposal to End Subsidies for Cheap Meat

SANDY WAINSCOTT (STUDENT)

Introduction: McDonald's hamburgers are popular because they're satisfying and pretty darn cheap. It's quite amazing, when you think about it, that McDonald's can sell a double cheeseburger on their 99 cent menu. The average American wage earner can buy this burger after just 3 minutes of work. But I will argue that the hamburger is cheap because the American taxpayer subsidizes the cost of meat. Uncle Sam pays agribusiness to grow feed corn while not requiring agribusiness to pay the full cost for water or for cleaning up the environmental damage caused by cattle production. If meat producers had to recover the true cost of their product, the cost of meat would be substantially higher, but there would be offsetting benefits: a healthier environment, happier lives for cows and chickens, and healthier diets for all of us.

1. Meat is cheap partly because
 - a. U.S. taxpayers give farmers money to grow feed corn, which is fed to cows
 - b. U.S. taxpayers provide farmers with cheap water
2. Keeping meat cheap creates significant costs to our health, to the environment, and to animals
 - a. Cheap meat threatens health
 - (i) Factory-style farms significantly reduce effectiveness of antibiotics
 - (ii) Antibiotic-resistant pathogens are potentially huge killers
 - (iii) Factory farms are likely sources of new swine and bird flus
 - (iv) Meat-related food poisoning harms millions of people per year with thousands of deaths
 - b. Cheap meat threatens the environment
 - (i) Factory farms create 130 times more sewage than humans
 - (1) This sewage is not treated
 - (2) It is held in open-air lagoons and releases large amounts of ammonium nitrate into the atmosphere and water supply

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