Pros and cons of nuclear energy essay sample

What’s nuclear power’s biggest advantage? It doesn’t depend on fossil fuels and isn’t affected by fluctuating oil and gas prices. Coal and natural gas power plants emit carbon dioxide into the atmosphere, which contributes to climate change. With nuclear power plants, CO2 emissions are minimal. According to the Nuclear Energy Institute, the power produced by the world’s nuclear plants would normally produce 2 billion metric tons of CO2 per year if they depended on fossil fuels. In fact, a properly functioning nuclear power plant actually releases less radioactivity into the atmosphere than a coal-fired power plant [source: Hvistendahl]. Plus, all this comes with a far lighter fuel requirement. Nuclear fission produces roughly a million times more energy per unit weight than fossil fuel alternatives [source: Helman]. And then there are the negatives. Historically, mining and purifying uranium hasn’t been a very clean process. Even transporting nuclear fuel to and from plants poses a contamination risk. And once the fuel is spent, you can’t just throw it in the city dump.

It’s still radioactive and potentially deadly. On average, a nuclear power plant annually generates 20 metric tons of used nuclear fuel, classified as high-level radioactive waste. When you take into account every nuclear plant on Earth, the combined total climbs to roughly 2, 000 metric tons a year [source: NEI]. All of this waste emits radiation and heat, meaning that it will eventually corrode any container that holds it. It can also prove lethal to nearby life forms. As if this weren’t bad enough, nuclear power plants produce a great deal of low-level radioactive waste in the form of radiated parts and equipment. Over time, spent nuclear fuel decays to safe radioactive levels, but this process takes tens of thousands of years. Even

low-level radioactive waste requires centuries to reach acceptable levels. Currently, the nuclear industry lets waste cool for years before mixing it with glass and storing it in massive cooled, concrete structures. This waste has to be maintained, monitored and guarded to prevent the materials from falling into the wrong hands. All of these services and added materials cost money — on top of the high costs required to build a plant.

The ongoing turmoil at the Fukushima nuclear power plant following the devastating earthquake and tsunami in Japan has catalyzed a new debate about the future of nuclear power in the U. S. and around the world. While environmentalists have long argued against the use of nuclear power, citing the longterm hazards from radioactive waste among the chief concerns, even some prominent environmental advocates have thrown support behind the continued or expanded use of nuclear power now that the threat of global warming seems to dwarf many other concerns. So what are the pros and cons of nuclear power? If you’re new to the debate, this feature will help you come up to speed. Pro: Carbon-Free Electricity

The big selling point to environmentalists about nuclear power plants is that they are said to emit almost no carbon dioxide. Some prominent environmentalists have embraced nuclear power because they see the imminent threat of global warming outweighing the potential threat of localized nuclear meltdowns. But how true is the claim? When all is said and done—between mining the uranium, refining and enriching fuel, and building and operating the plant—a big 1, 250 250-megawatt nuclear facility produces an estimated 250, 000 tons of carbon dioxide during its lifetime, according to one analysis.

If that’s true, the entire U. S. nuclear industry has produced something around 26 million tons of carbon dioxide. Sounds like a lot, right? In contrast, coal-fired plants produce close to 2 billion tons of carbon dioxide every year in the U. S. alone while also emitting lots of other pollution: soot that causes lung diseases; sulfur dioxide and nitrogen oxides that cause smog and acid rain; and mercury that contaminates fish. In fact, coal kills 4, 000-times as many people as nuclear power, according to one analysis. As of 2010, coal provided the U. S. close to 50% percent of its electricity, and nuclear about 20%. Coal, like uranium, is cheap and plentiful, but neither one could exactly be called a friend to the environment or human health. Con: Risk of Catastrophe

Fukushima has joined Three Mile Island and Chernobyl in the vocabulary of dangerous nuclear mishaps. The explosion at Chernobyl’s nuclear plant in the Ukraine showed how nuclear energy could just as easily destroy us as it nurtures our everyday needs. Large amounts of radiation were released on that day in April 1986, and it’s been estimated that nearly 5 million people of the former Soviet Union were affected by the spread of radiation, including 4, 000 who developed thyroid cancer from drinking radioactive milk and other exposures. In Japan, radioactive spinach, milk and drinking water – some of it contaminated enough to be unfit for consumption – has sparked worldwide runs on potassium iodine pills; while the radioactivity drifting on the winds to the U. S. West Coast has been miniscule, and precautions like taking iodine is not recommended by experts, these episodes of radioactive drift and contamination are reminders that dangerous elements can and will travel far. The United States is not immune to its own potential disasters:

“ There are 104 commercial reactors operating in the U. S.; twenty-three of them are the aging GE Mark 1 type used at Fukushima. Four reactors are near seismic fault lines in California alone,” as CBS News pointed out. And MSNBC reported that the Nuclear Regulatory Commission has put odds on nuclear reactors being damaged by earthquakes, and the odds are 10 times better than an individual winning the multi-state Powerball lottery – and the risk isn’t necessarily where you’d expect it. By the NRC’s estimation, the 10 riskiest plants are all on the East Coast, with New York’s Indian Point – just 35 miles from the nation’s largest city – ranking as the riskiest. That said, public perception of the risks of radiation may be overblown, as many have pointed out in the wake of the Fukushima disaster. At the least, we’re often bad at weighing the relative risks of danger from various health threats. (Photo: Evacuees from the Fukushima Daiichi nuclear plant area in March, 2011. Photo by Tayama Tatsuyuki / Gamma-Rapho via Getty Images) Con: Long-Lived Nuclear Waste

The biggest stumbling block in support of nuclear power is the question of what to do with the 20-30 tons of radioactive waste that each reactor accrues annually. Currently, waste is stored at nuclear plants across the country as new waste storage schemes are devised – then fought over, scrapped, revised and fought over again. The Nuclear Regulatory Commission has said that waste can continue to be stored at plants almost 60 years after they shut down. But then what? Nuclear waste remains radioactive, and dangerous, for tens of thousands of years, meaning a storage system must be capable not only of safeguarding waste, but engineers must be smart enough to anticipate threats that might only

emerge thousands of years in the future. The current option being pushed is to bury the waste at Yucca Mountain, Nevada, but local residents and advocates have raised a series of concerns, ranging from potential groundwater contamination to earthquake risk. Anyway, as the Associated Press reported recently, there’s already more nuclear waste in the U. S. than would fit in the Yucca Mountain repository, at least as it’s been proposed.

Con: Cost

Nuclear power plants are known for being expensive to build, but relatively cheap to run. Worldwide, 62 new nuclear reactors are under construction, another 158 are being planned and yet another 324 have been proposed (one nuclear plant typically has several reactors). Still, it’s been reported that since 2008, plans to build reactors in nine U. S. states have been put on hold or aborted due to the astronomical financing needed, with estimates topping out at $10 billion per reactor. The low cost of running a nuclear facility—when compared with coal, oil or gas-fired plants—is mainly due to the relatively cheapness and power of uranium. By weight, the same amount of uranium can yield around 20, 000 times as much energy as coal.

Not surprisingly, the owners of many U. S. reactors built a generation ago are currently seeking new licenses to continue operating for another 20 or 30 years. But the apparently low cost is deceptive. Despite having the backing of government subsides since its inception 50 years ago, the nuclear power industry in the United States has never become economically viable enough to stand on its own. The Union of Concerned Scientists reported in February that more than 30 subsides have supported every stage of the nuclear fuel cycle and when added up those subsides exceed the average market price of

the power being produced. Due to the subsidies the industry receives, they are able to offset operating costs, which gives the industry a big competitive advantage over alternative energy sources. Though coal, oil and natural gas, which enjoy their own rich subsidies, renewable energy technologies have suffered from inconsistent and generally less-lucrative incentives. Con: Uranium Mining

Advocates for nuclear energy often cite it’s emissions-free electricity. But just as coal mining scars the land and pollutes water supplies, uranium mining doesn’t come without a heavy environmental cost. More plentiful than gold, silver or mercury in the earth’s crust, uranium is mined in around 20 countries and 85% of the world’s uranium comes from just six countries, according to the World Nuclear Association, an industry group. The chief danger lies with the mining waste; it contains radium, which is highly radioactive. Radon gas (one of the products that occur after radium undergoes natural radioactive decay) can expose workers and nearby communities to an array of health risks like lung cancer, bone cancer and lymphoma. What’s the Alternative?

Our reliance on coal (about half of U. S. electricity comes from burning coal) is the country’s single biggest source of carbon emissions. Overall, fossil fuels account for more than 80% of U. S. energy production (including oil for transportation), while nuclear power makes up 9% and renewable sources 8%. With the coming shift toward electric cars, how we generate electricity will only become more important. Most renewable energy production in the U. S. comes from hydroelectric dams, followed by burning wood and other plants; carbon-free wind, solar and geothermal sources account for just 15%

of renewable energy production and a miniscule slice of the overall energy mix. While each of these clean power alternatives has grown dramatically in recent years (wind power has nearly doubled in the last five years), critics contend that there isn’t adequate transmission capacity or land area available to scale up renewables adequately – at least not quickly enough to avert the worst consequences of climate change.

Proponents, meanwhile, point out that federal tax breaks have for generations consistently boosted the coal, oil, natural gas and, less consistently, nuclear industries, while the incentives for research, development and deployment of renewable energy technology have been inconsistent and paltry. Natural gas offers a “ fossil fuels-light” alternative, and it has been increasingly used in recent years as prices have dropped and environmental regulations have been toughened; however, concern over water pollution from the natural gas drilling technique known as “ fracking,” or hydraulic fracturing, looms as a big question mark over the future expansion of the industry in the U. S.

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