

The Truth About Nuclear Power

Separating economic myth from economic fact

Veronique de Rugy | March 25, 2011



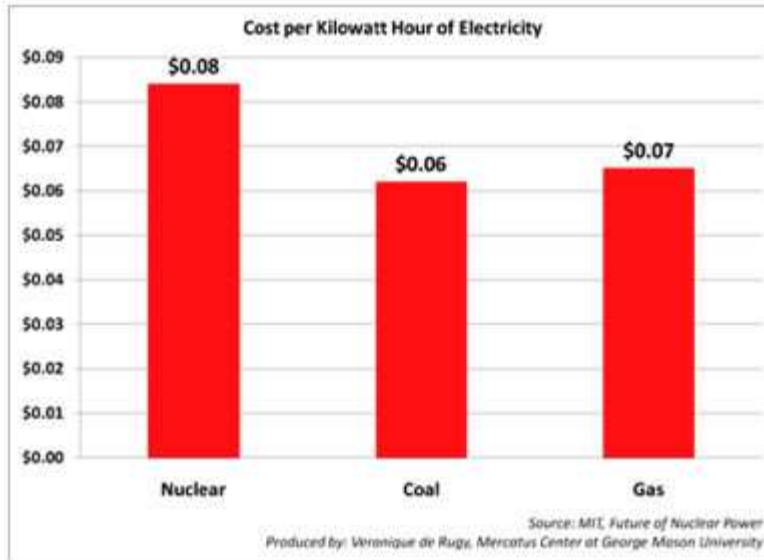
Editor's Note: Reason columnist and Mercatus Center economist Veronique de Rugy appears weekly on Bloomberg TV to separate economic fact from economic myth.

Myth 1: Nuclear power is a cheap alternative to fossil fuels.

Fact 1: It isn't.

As Jerry Taylor of the Cato Institute wrote in *Reason* magazine in 2009, “Nuclear energy is to the Right what solar energy is to the Left: Religious devotion in practice, a wonderful technology in theory, but an economic white elephant in fact (some crossovers on both sides notwithstanding). When the day comes that the electricity from solar or nuclear power plants is worth more than the costs associated with generating it, I will be as happy as the next Greenpeace member (in the case of the former) or MIT graduate (in the case of the latter) to support either technology.”

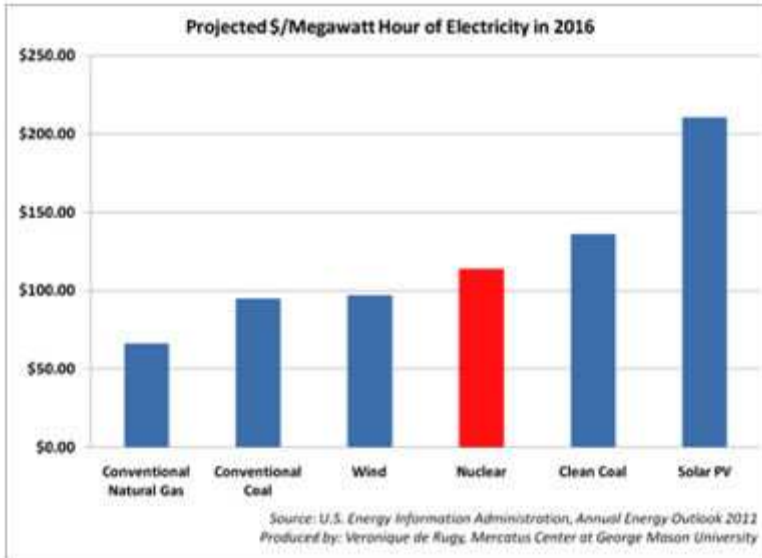
Until that time comes, producing nuclear energy remains a very costly business.



The chart above uses data from a 2009 interdisciplinary study at the Massachusetts Institute of Technology to compare the costs of generating a kilowatt hour of electricity using nuclear, coal, and gas power. Looking at this data, the cost differential is clear—nuclear-powered energy costs 14 percent more than gas to produce a unit of electricity, and it costs 30 percent more than coal. Furthermore, according to Gilbert Metcalf's recent National Bureau of Economic Research paper on energy, this increased cost of nuclear energy includes a baked-in taxpayer subsidy of nearly 50 percent of nuclear power's operating costs.

While the nuclear industry in the United States has seen continued improvements in operating performance over time, it remains uncompetitive with coal and natural gas on the basis of price. This cost differential is primarily the result of high capital costs and long construction times. Indeed, building a nuclear power plant in the United States has cost, on average, three times as was originally estimated.

The United States Energy Information Administration estimates that these cost trends will continue for the near future.



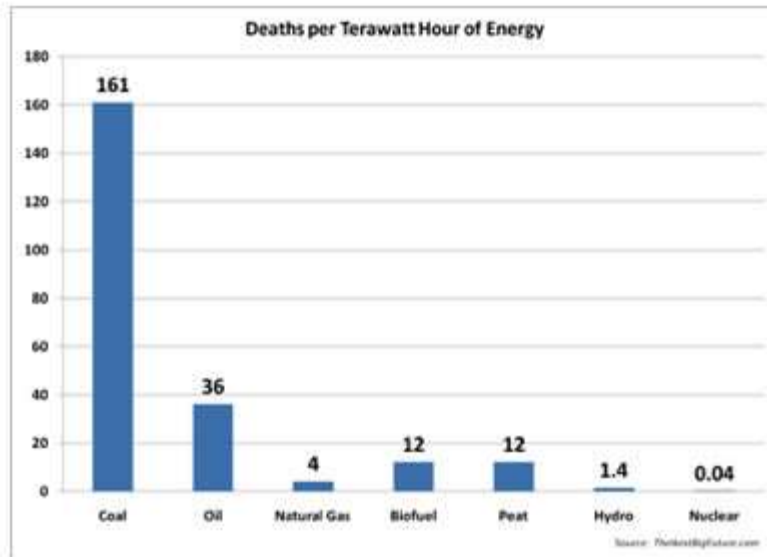
This chart compares the projected costs of generating electricity in the year 2016 using various sources. As you can see, nuclear power remains more expensive than other conventional forms of power.

As Taylor notes, this is why nuclear power has only flourished in countries where the government has intervened on its behalf.

Myth 2: *Risk is the main problem with nuclear power.*

Fact 2: *Cost is the main problem, not risk.*

Radiation is terrifying to most people. And like most things, the less you actually know about it, the more frightening it can be.



Safety is certainly a critical issue, as the tragedy in Japan makes clear. However, so far the death toll from the current nuclear crisis in Japan is zero.

The chart above uses data compiled from various sources to compare the deaths per terawatt of energy produced. Deaths resulting from the production of nuclear power are *over 4000 times less* than the rate of death resulting from the production of energy from coal.

Writing in the *Journal of American Physicians and Surgeons*, Bernard Cohen, a physics professor at the University of Pittsburgh, puts the risk from nuclear power into context, comparing the relative risk of nuclear power to other activities. He used a one-in-a-million chance of increased risk of premature death as a standard. His calculations indicate that if one lived at the boundary of a nuclear power plant for five years, there would be an increased risk of premature death from nuclear radiation of one in a million. That risk would decline significantly as one moved further away from the plant.

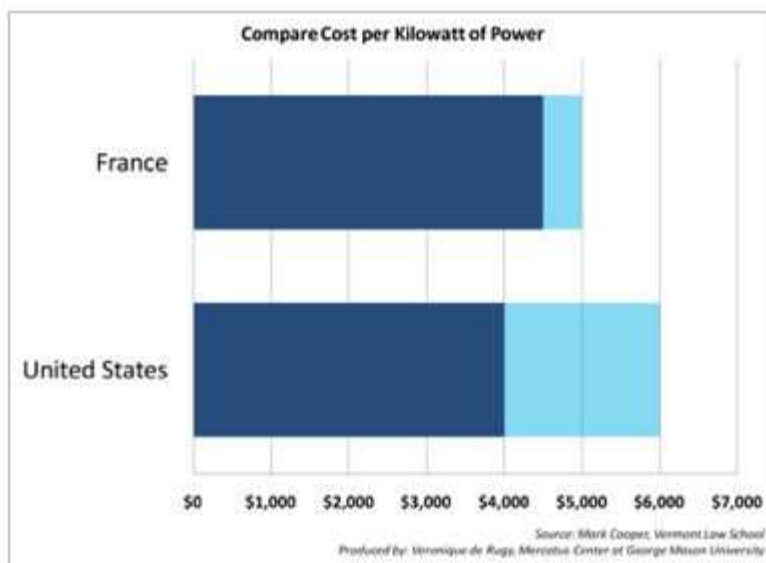
Put differently, Cohen found that the risk of living next to a nuclear power plant is comparable to the risk incurred from riding 10 miles on a bicycle, riding 300 miles in an automobile, or riding 1,000 miles in an airplane.

In fact, Steven Chu, President Barack Obama's energy secretary, has made it clear he doesn't think nuclear power is dangerous per se. When asked to compare coal and nuclear energy in 2009, Chu responded: "I'd rather be living near a nuclear power plant."

That being said, what happened in Japan reminds us that while nuclear doesn't kill people on a yearly basis, it has the potential to be very lethal under certain circumstances. However, the idea of risk-free world is unrealistic because unanticipated vulnerabilities are inevitable in any complex system. Future technologies may reduce the chance of some terrible disaster but it won't ever eliminate it completely. Like all other sources of energy, nuclear power entails some risk.

Myth 3: *The spread of nuclear power has stalled in the U.S. due to a hostile regulatory environment.*

Fact 3: *Nuclear power has stalled because it is simply not profitable.*



Many Americans argue that government regulations are the real reason why nuclear power is so expensive. As evidence, they point out that in France, where there is more opportunity to build nuclear power plants, nuclear power is safe and affordable.

It is true that France gets about 75 percent of its electricity from nuclear power. It is also true that the country has avoided a large-scale disaster due to the many safety regulations it has imposed, most of which are similar to regulations enacted in the U.S.

However, producing nuclear energy in France is not any cheaper than it is here. The chart above shows, in U.S. dollars, the parity between the costs of generating nuclear power in the United States (which has a relatively strict regulatory regime) and France (which has a

relatively loose one).

The chart presents a range of estimates of the costs of nuclear reactors in the two countries gathered by Mark Cooper, a senior research fellow for economic analysis at the Institute for Energy and the Environment at the Vermont Law School. As Cooper found, the ranges overlap: France's estimated cost of a kilowatt of power is between \$4,500 and \$5,000; the United States' estimated cost for this unit of power is between \$4,000 and \$6,000.

From the start of commercial nuclear reactor construction in the mid-1960s through the 1980s, capital costs (dollars per kilowatt of capacity) for building nuclear reactors rose dramatically. Although unit costs for technology usually decrease with volume of production because of scale factors and technological learning, nuclear power has gone in the opposite direction. This exception to the rule is usually attributed to the idiosyncrasies of the nuclear regulatory environment as public opposition grew, laws were tightened, and construction times increased.

As a result, no new nuclear power plants have been built in the United States in 29 years. Nuclear has proven to be a poor investment, producing far more expensive electricity than originally promised.

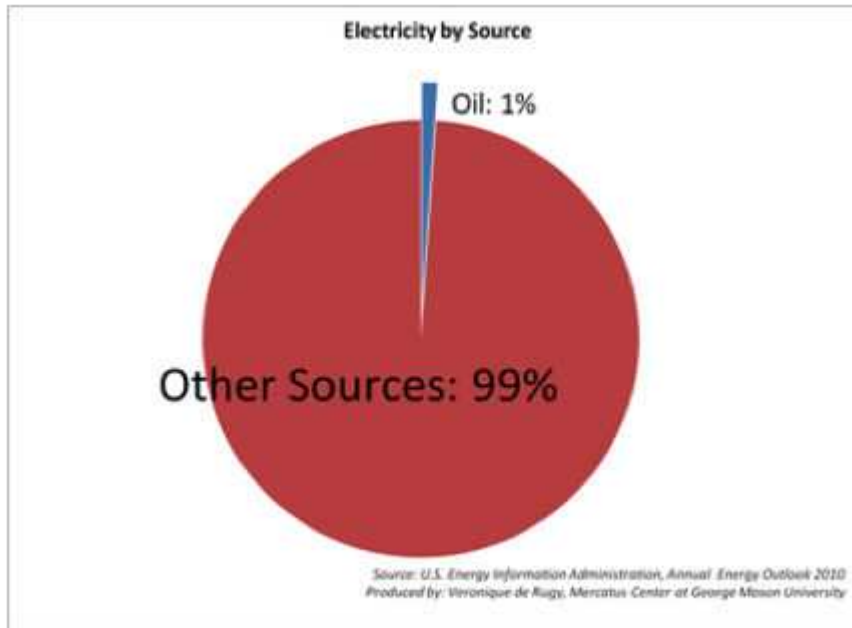
Myth 4: *Nuclear power is the key to energy independence.*

Fact 4: *More nuclear doesn't mean less oil.*

On last Sunday's *Meet the Press*, Sen. Charles Schumer (D-NY) cited America's need to get off of foreign oil as a strong reason for pursuing nuclear power.

Setting aside the misguided goal of so-called energy independence, Schumer is still wrong. Oil is primarily used in vehicles and in industrial production. Nuclear power is primarily used for electricity.

As the chart below illustrates, data from the United States Energy Information Administration shows that the vast majority of our electricity comes from non-oil sources.



Interestingly, according Michael Levi, a senior fellow and director of the program on energy security and climate change at the Council on Foreign Relations, it wasn't always the case. "During the heyday of nuclear power, the early 1970s (45 plants broke ground between 1970 and 1975)," Levi writes, "oil was a big electricity source, and boosting nuclear power was a real way to squeeze petroleum out of the economy. Alas, we've already replaced pretty much all the petroleum in the power sector; the opportunity to substitute oil with nuclear power is gone."

Perhaps more importantly, less than 1 percent of the oil used in the United States today goes to generate electricity while 70 percent is consumed by the transportation sector, with roughly 30 percent of oil being used by the residential and industrial sectors.

The bottom line is that more nuclear power would mean less coal, less natural gas, less hydroelectric power, and less wind energy. But more nuclear won't mean less oil.

Am I against nuclear power? It certainly looks like nuclear can never be a sustainable source of energy because it is just too expensive. And while it is a safe source of energy overall, there are tremendous risks in those instances where something goes disastrously wrong. The probability of such a dire scenario may be low, but the need to build-in protections against it will always raise the cost of producing nuclear power.

But more importantly, what I am against is the government deciding that nuclear power must be encouraged and then subsidizing the industry. On that point, I leave the last word to *Reason* Science Correspondent Ronald Bailey.

“The main problem with energy supply systems is that for the last 100 years, governments have insisted on meddling with them, using subsidies, setting rates, and picking technologies,” Bailey observes. “Consequently, entrepreneurs, consumers, and especially policymakers have no idea which power supply technologies actually provide the best balance between cost-effectiveness and safety. In any case, let’s hope that the current nuclear disaster will not substantially add to the terrible woes the Japanese must bear as a result of nature’s fickle cruelty.”

Contributing Editor Veronique de Rugy is a senior research fellow at the Mercatus Center at George Mason University.