Written by Jeffrey Mahn on February 20, 2024
Published in the March 11, 2024 issue of the New American magazine. Vol. 40, No. 05

What's Stifling Nuclear Power?

AP Images
Bad omen: The United Nations bragged that the recent COP28 agreement signals the "beginning of the end of the fossil fuel era." However, experts note that ditching fossil fuels portends an end to life as we know it.

Virtue-signaling, global-warming zealots push their net-zero agenda, determined to eliminate fossil fuels for the supposed goal of saving Mother Earth.

UN Secretary-General António Guterres opened last November's COP28 climate-change conference by warning that this existential objective "is only possible if we ultimately stop burning all fossil fuels."

"There really shouldn't be any more coal-fired power plants permitted anywhere in the world," agreed President Joe Biden's climate czar, John Kerry.

Neither they nor their COP28 cohorts offered scientific justification for their hackneyed proposals. They couldn't; there isn't any.

Nevertheless, the year 2050 is their internationally agreed-upon deadline based on the erroneous premise that carbon dioxide is an atmospheric pollutant. On the contrary, scientists call it the "gas of life" that has a minuscule effect on Earth's temperature.

"Doubling CO_2 has virtually no effect on warming," explained Dr. William Happer, Princeton University professor emeritus of physics, during an Institute of Public Affairs event last November. "What it will have an effect on is crop yields — a very beneficial effect. They would be increased considerably were CO_2 to double, the opposite being equally true, with less CO_2 reducing crop yields. So, more food with increased CO_2 and less without it."

Obviously, international bureaucrats care nothing for scientific reality. Instead, they doggedly insist on crippling mankind by cutting off access to fossil fuels, which currently account for more than 80 percent of world energy production, according to the International Energy Agency.

Together, wind and solar account for less than 12 percent of world energy production, per the Energy Institute's 2023 Statistical Review of World Energy — and they are only able to supply that small amount with steep government subsidies, and only when the sun comes out or the wind happens to be blowing at just the right speed.

So-called fossil fuels built the modern industrial world, and so-called renewables are completely incapable of replacing them. Yet even though we don't need a "zero-carbon solution," because carbon dioxide is not dangerous, there is one energy source at the ready that could replace most fossil fuels in short order. Nuclear power is that energy source. Unfortunately, it is also the boogeyman of the environmentalist lobby, mainly because it works.

The Safety of Nuclear Power

The smear against nuclear power was given impetus in 1979 with the partial meltdown of a reactor at Pennsylvania's Three Mile Island (TMI). It resulted in a grand total of zero deaths, zero injuries, and zero long-term adverse health effects from radiation. These are the official findings of the state's Department of Health, which for 18 years monitored more than 30,000 people living within five miles of the plant.

Japan's Fukushima power plant tells a similar story, despite the fact that the earthquake that hit in 2011 was far greater in magnitude than the plant was rated to withstand, and that devastating tsunamis resulted in significant plant damage. The waves claimed thousands of lives, as did forced evacuations from the area around the power plant, but "no one was exposed to dangerous radiation doses," not even emergency crews working at the plant, according to nuclear energy expert Rod Adams of Atomic Insights. (The Japanese government's officially recognized death toll from radiation exposure is one — an unidentified man in his 50s, diagnosed with lung cancer in 2016, who died two years later. Japan's Ministry of Health awarded his family compensatory damages.)

The worst nuclear plant accident in history occurred in 1986, with an explosion at Ukraine's Chernobyl facility, which lacked the safeguards inherent in nuclear-reactor construction in the Western world. Official mortality estimates vary, from 31 deaths tallied by the International Atomic Energy Agency to fewer than 100 reported by the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR). Despite much media and bureaucratic clamoring to the contrary, UNSCEAR admits that the accident resulted in no long-term adverse health effects. "The worst accident in 70 years of nuclear energy history is comparable to a plane crash," writes Tomas Pueyo on his Uncharted Territories blog.

Notice that only three major accidents mar nuclear power's history, which includes 667 nuclear plants that have been built worldwide since 1951, according to the World Nuclear Association. In fact, the safety record of nuclear power eclipses that of all other sources, including the much-younger media darlings of modern commercial wind and solar.

Data compiled by Sana Kazilbash of Engineering.com tell the story. Based on a measurement of deaths per 1,000 terawatt-hours of electricity production, nuclear's score is 90. Wind takes second place at 150, and solar ranks third, with numbers ranging from 150 to 440, depending on the application. Hydro (1,400), natural gas (4,000), oil (36,000), and coal (100,000) can't compare.

Not only is nuclear the safest, but it is also the most efficient of all energy sources. "Capacity factor" is the ratio of actual energy produced to potential energy production at maximum output. Nuclear boasts a capacity factor of 93.5 percent, according to the U.S. Department of Energy. Natural gas is the closest competitor, at 56.8 percent. Capacity-factor percentages of other energy sources are 47.5 (coal), 39.1 (hydropower), 34.8 (wind), and 24.5 (solar).

Calculating Risk

Despite its safety and efficiency records — unmatched by any other energy source — the perception of nuclear power as uniquely dangerous endures. What drives that irrational fear?

One driver is the onerous regulatory burden placed on the nuclear industry, which convinces people that their fears are well-founded. Regulators in the United States strive for an unrealistic "as low as reasonably achievable" (ALARA) goal, which embodies the fiction that any release of radioactive material is unacceptable, no matter how small.

Associate Professor Robert B. Hayes of North Carolina State University's Department of Nuclear Engineering calls it "fearmongering" to promote ALARA. "You cannot live without radiation," he said in a YouTube short posted in January, offering the example of radioactive potassium, which our bodies require for proper cellular metabolism.

Regardless, U.S. regulators demand that radiation levels from nuclear plant operations remain far below levels at which adverse health effects have been observed — in some cases below even natural background radiation. ("Background" refers to radiation from sources such as the sun, soil, rocks, building materials, and potassium-40 in your own blood.)

Regulators' tool for perpetuating the irrational ALARA approach is called a Probabilistic Risk Assessment (PRA), a methodology that evaluates public risk associated with the operation of commercial nuclear power reactors. However, this model is based largely on theoretical risk using inference and extrapolation, rather than a more realistic assessment based on actual risk observations over the more than 70-year history of nuclear power.

Indeed, the PRA for any given nuclear power plant instead references probabilistic risk models developed from earlier reactor safety studies. The latter assume conservatively high radioactive material releases under severe accident conditions, even though actual experience proves these forecasts to be unrealistic.

Another flaw of PRAs is that they are based on the linear no-threshold (LNT) dose-response and collective-dose models for predicting cancer fatality risk.

LNT is an oft-debunked hypothesis that asserts a linear relationship between radiation dose and the risk of adverse effects, with no threshold dose below which there is no risk.

Its equally irrational cousin, the collective-dose model, adds up the doses received by each individual within a population to determine risk. In his 2005 book *Underexposed: What If Radiation Is Actually Good for You?*, Ed Hiserodt explains collective dose by way of analogy: "If 100 aspirins are a fatal dose for an individual, then when 100 people take one aspirin each, they have had a 'collective dose' of 100 aspirins — therefore one of them is going to die."

Use of these models in nuclear plant PRAs immediately calls into question the realism of PRA risks. Regardless, based on PRAs, there are many complex regulations for nuclear energy facilities to prevent very unlikely events that could release small amounts of radioactive material.

These regulations have hugely increased the costs of facility construction and operation. Such problems would disappear should realistic risk probability calculations become the norm.

Myth vs. Reality

However, in conducting realistic calculations, it must be noted that low probability events do occur despite best efforts to minimize their likelihood. Just because an event has an extremely low probability or frequency doesn't mean it can't happen today, tomorrow, or next week. It is not likely to happen, but neither are any other unlikely catastrophes (e.g., earthquakes, floods, tsunamis, etc.).

Let's take the accidents at TMI and Fukushima as examples. We know from these plants' PRAs and from experience that (1) the observed probability of occurrence of some accidents is greater than assumed in plant PRAs, and (2) radiological consequences of these accidents were overestimated (i.e., latent radiation-induced cancers were overestimated relative to actual observations, a fault of the LNT error).

These observations led to the U.S. Nuclear Regulatory Commission's 2012 State-of-the-Art Consequence Analysis, which concluded that latent cancer fatality risk from nuclear plant accidents is "millions of times lower than the general cancer fatality risk in the United States from all cancer causes," even assuming the LNT model.

In addition, the consequences of unwarranted public evacuations at both TMI and Fukushima were far more damaging to public health than was the release of radiation.

Energy dense: The U.S. Department of Energy reports that one seven-gram uranium pellet can generate as much energy as 17,000 cubic feet of natural gas, 120 gallons of oil, or one ton of coal. (Getty Images Plus)

Ignorance: More Dangerous Than Radiation

The irrational ALARA approach, based on flawed LNT and collective-dose models, fuels the entrenched anti-nuclear risk narrative among major media. They, in turn, continually stoke a frightened public, most of whom are accustomed to parroting what they have heard rather than thinking critically.

However, risks associated with complex technologies such as nuclear power are perceived by the public to be much higher than warranted. Once the anti-nuclear narrative is implanted, it's extremely difficult to counteract erroneous beliefs with facts, especially when those trying to communicate facts are alleged by the biased media to be incompetent or corrupt.

Determining what constitutes an "acceptable" level of risk will seldom be without controversy, so the question is: For what level of risk should a nuclear power plant be designed? The answer to that question depends upon the answers to two additional questions: First, recalling nuclear power's safety record in relation to other reliable power sources, what level of risk is society willing to accept to assure a supply of abundant and reliable electricity? Second, what cost is society willing to incur to guarantee only "tolerable" nuclear power plant damage from any conceivable risk (e.g., a meteor strike)?

If society is unwilling to accept very low probability risks or bear the increased costs associated with bringing all conceivable risks into a nuclear power plant's design, then abundant and reliable electricity may one day become an historical artifact.

To fully unlock the potential of the atom, it is crucial that the gap between perceived and actual risks is addressed. Policymakers and regulators must ensure that their decisions regarding nuclear power risks do not create greater risks elsewhere. In particular, they need to weigh the cost of unwarranted regulatory measures against the societal benefits provided by nuclear energy.

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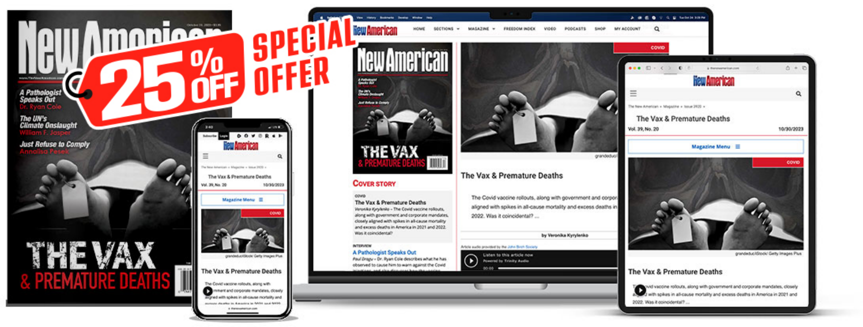

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