

Five Realities of Nuclear Energy

By Jerry Paul

Just over three months ago, one of the largest earthquakes in recorded history, combined with an extraordinary tsunami, wreaked havoc on Japan and triggered a series of dramatic events at the Fukushima Dai-ichi nuclear plant. While these events were not caused by the operation of the plant, and, the facility withstood the earthquake as designed, Americans have understandably asked natural questions about our plants here in the United States.

Could it happen here? Are nuclear plants safe? Do we really need nuclear energy? What about the used fuel that becomes nuclear waste? What are industry and government doing to keep us safe?

For each of these questions, there are rational answers based on the laws of physics, thousands of peer-reviewed scientific and academic studies, and decades of successful operating experience. Moreover, the U.S. Nuclear Regulatory Commission and the independent scientific community have been thoughtfully conducting thorough reviews of American nuclear plants to ensure that we harvest legitimate lessons learned from these recent events. Yet in the wake of Fukushima, some traditional nuclear power opponents have been cherry picking information and scaring people to advance their agenda.

As a former nuclear reactor engineer and Deputy Administrator of the U.S. National Nuclear Security Administration, I have seen, touched and experienced nuclear technology up close for the better part of my professional life. I have worked with and around the smartest, most technically proficient scientists and engineers in the nuclear industry. And while they might have a lot to say on these topics, unfortunately, these are not typically the people we see holding press conferences or appearing as talking heads on television or in public forums.

As we continue to learn about and understand the implications of the Fukushima event, here are five realities that are sometimes lost in the debate:

1. Eliminating nuclear energy is not realistic if we want to maintain our quality of life.

About 20 percent of the electricity that powers American homes comes from nuclear energy, while about 68 percent comes from greenhouse-gas-emitting fossil fuels like coal. Nuclear plants continuously produce large amounts of electricity and make up about 70 percent of America's emissions-free generation. Wind and solar make up 8 percent and .01 percent, respectively. Solar, wind and nuclear energy all play a valuable role in our energy mix, but currently, nuclear plants are the only large source of emissions-free generation that can provide the amount of power we need to keep our homes and businesses running 24 hours per day.

Nuclear energy also helps keep electricity costs low. Including the costs of operations, maintenance and fuel, nuclear energy has the lowest production cost of any major energy source. For the past 15 years, the cost of nuclear fuel has remained steadily lower than oil, natural gas and even coal. Of course, these savings, and the benefits of being non-emitting, are realized by utility customers.

2. Day-to-day activities present a greater health threat than a local nuclear plant.

The anti-nuclear activists often invoke the perceived "danger" associated with nuclear plants. A review of the facts, however, tells a vastly different story regarding actual risk.

In 2010, almost 34,000 people in the United States died in auto accidents. That's about

one death every 15 minutes. In the past 60 years while nuclear energy supplied American electricity, *annual* fatalities from aircraft crashes ranged from a high of 3214 deaths in 1972 to a low of 771 deaths in 2004.

Yet in the entire history of the nuclear industry, there have been three major reactor accidents: Three Mile Island, Chernobyl and Fukushima. And apart from Chernobyl -- which was caused by a flawed reactor design that is not employed anywhere in the United States -- no nuclear workers or members of the public have ever died as a result of exposure to radiation from a commercial nuclear plant. This fact is attributable to sound designs, strong construction, a culture in which safety always comes first, a highly trained, conscientious workforce, and rigorous government oversight.

3. Nuclear power plants are constantly upgraded.

Unlike cars or appliances that are typically run until they break down, American nuclear plants have a proactive aging-management program that replaces equipment well before it has the opportunity to malfunction. Using the car analogy, think of it this way: while the body of the car may have been manufactured years ago, its engine and safety systems are upgraded and rebuilt continuously with the state-of-the-art components over time.

In 2009 alone, the U.S. nuclear industry invested approximately \$6.5 billion to upgrade plant systems with the latest technology. Continuous upgrades have always been the standard for American nuclear plants for many reasons – most importantly protecting the health and safety of the public and workers. This industry considers continuous improvement to be a necessary investment rather than "optional" expense.

4. The amount of spent fuel is small and can be managed safely.

In many cases, the issue of storing used fuel is discussed without proper context.

Used nuclear fuel is in the form of solid pellets about the size of a pencil eraser. The fact is, the total amount of waste generated by the entire U.S. nuclear industry over more than 60 years of operation would fit in the area of one football field. For this entire time, we have safely and securely stored this fuel onsite in specially-designed pools and in strongly-engineered dry storage containers.

Nobody would argue that the onsite storage of used fuel is ideal. But, it is a responsible option for now since the relative amount of used fuel is so small; Multiple levels of safety and security protection have proven to be effective; Over 50 years of scientific research, engineering and experience proves that it can be stored with little environmental impact; and onsite storage is the only option utilities have until the federal government fulfills its responsibility to identify a long-term disposal solution.

Moreover, only a small percentage of the available energy has been harvested from this fuel at the point when regulations require it to be stored on-site. This fuel should be recycled and re-used, as other countries have successfully concluded. But until political barriers in this country allow for this logical path, it must be stored on-site.

5. Nuclear plants have more government oversight than any other industry.

The rigor and comprehensiveness of nuclear safety oversight in the United States is extraordinary. Our licensing and regulatory process is studied and emulated worldwide.

Every nuclear power plant in the United States has multiple government inspectors on-site year-

round. They are top experts in the field and have unrestricted access to all vital areas of the plant, including plant records. In addition to these daily oversight activities, each plant frequently undergoes multiple evaluations and inspections that include detailed reviews of security, emergency planning, environmental protection, industrial safety, critical plant systems, plant culture, and safety processes – all of which are aimed at ensuring the continued safe operation of these facilities.

Honest questioning from concerned citizens regarding nuclear energy is understandable. A thinking society should continuously strive for accurate, credible validation of its technologies. As to the safety and security of U.S. nuclear plants, the facts are reassuring. I firmly believe that these – and many other facts – should be the basis for any discussion on the future of nuclear energy here in America.

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