A PERSPECTIVE ON NUCLEAR POWER, URANIUM, and the POST-FUKUSHIMA REVIVAL*

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This is the rest of the story. Nuclear power, because of its use for both peaceful and military purposes, causes angst among some people, and produces fuel for those with other purposes, albeit competing energy sources, religion, or politically belligerent politics (1). Hence, as nuclear power was being developed in the 1970s in the U.S., the Three-Mile Island incident occurred (but no one was killed or irradiated outside the plant; two workers were burned with hot water). Accidents happen occasionally with any industrial activities, but the media panicked us all into retreating from nuclear power because of the fear of radioactivity (2).

The Sendai Plant, among others, is being re-started in Japan (22).

Then, the Chernobyl disaster (within a dual military-commercial reactor with serious design flaws) occurred a few years later, which caused us to retreat even further from using nuclear power to generate electricity. Heroic workers and fireman trying to control the fire lost their lives. And, nearly 4,000 children subsequently contracted thyroid cancer… but almost 99% of them have recovered after treatment (3).

After years of debate and re-evaluation of the impact of the event (4), the merits of nuclear power emerged again from the plethora of emotional adversaries to demonstrate its usefulness on the basis of its economic viability and on its actual safety record. After decades passed, and because of economic necessity, nuclear plant construction began again, this time to replace older reactor models and to begin installing improved nuclear power plants; but then again, an earthquake off Japan's coast this time created tsunamis that created havoc and caused the death of thousands of people, and which also flooded and damaged the backup power supply system that was designed to run the water pumps to keep the fuel rods cool at the plant in Fukushima. Absent the power to the pumps, the core of fuel rods over heated and was exposed while the water boiled away, and hydrogen gas collected in the building. The gas was ignited by an electrical spark creating the explosion that demolished the plant building, and which contributed to releasing radioactive material to the surrounding areas.

Not only has no one died from radiation releases at Fukushima, not a single person experienced radiation sickness. It was only the major physical destruction caused by the tsunami that cost thousands of lives, while the media focus for years afterward remained focused only on the so-called radiation disaster. Once again the media tried to panic the public, but after many months of sampling the region, the general conclusions have been reached by the scientific community that although radiation was released it was not widespread. More importantly, the level of radiation didn't reach dangerous levels except within the reactor area of the plant (5). Technology can now measure extremely low levels of radioactivity, the context of which is often obscured by the media and exaggerated by nuclear advisaries.

During the past few years, the world revisited the safety features of the more than 435 reactors (especially those built along coastlines), and have redesigned the back-up power systems to avoid such failures in the future. One design even included a small nuclear reactor installed underground onsite to provide emergency power, if needed (6).

Over the past year or so we have observed strong evidence that nuclear power is up and into a new expansion period (7). Japan has realized that they must re-start most of their 54 existing nuclear power plants because they need economic power supplies (wind, solar, and geothermal sources have not been shown to be economic or scalable). The existing plants are now being equipped with new systems to withstand earthquakes and any tsunami of the magnitude anticipated in the future. The U.S., U.K., Brazil, Bolivia, India, Vietnam, Poland, Jordan, Egypt, and the UAE have begun to build, and Saudi Arabia and other Middle Eastern countries are considering nuclear as the energy of choice.

Even Germany is re-considering their option for politically and environmentally safe and economically sensible sources of energy (8). Forty-four reactors are under construction in China (9). The plans for hundreds of coal-fired plant have been scraped; Russia and India are gearing up to begin new construction, and in the U. S., there are currently 62 commercially operating nuclear power plants with 100 nuclear reactors in 31 states, with five new plants under construction and 40 other sites are either under consideration or in design stages. World-wide, the current 435 plants are expected to expand to over 600 within the next 30 years, but earlier if the new standard design reactors are adopted.

With the anticipated demand for uranium fuel, the uranium prices have begun to rise, which naturally sparks off uranium company exploration, mergers and acquisitions, and new mining and processing plants coming on-line in the U.S., Australia, Canada, Kazakhstan, and an increasing number of locations throughout the world, with early activities beginning to explore off world on the Moon and Mars by China, India, and just recently the U.S. A re-purposed NASA encouraging commercial activities has changed their focus recently and have re-entered the 2nd Space Race to the Moon (10)(23), although the U.S. may be late again entering the race.

In the Committee's function to monitor the activities in the energy arena of the U.S. and overseas, we have concluded that natural gas and nuclear power will dominate energy sources for decades to come, both of which will likely replace coal, while wind and solar will continue to be tested to determine if they can have a significant place in the energy picture (after government subsidies are removed (24)), and whether they can be scaled up to meet the needs in other than remote areas away from national power grids and to meet the operation and maintenance demands of their moving parts (13).

Coal may even become useful in time other than for burning to produce electricity. A new Carbon Age is dawning using "clean coal" after all and is no longer just an oxymoron but many industrial and academic researchers have visions of coal becoming germane economically and environmentally sound (11). Products of carbon will become widespread in the foreseeable future, both on Earth and off world (12).

Climate-change issues will re-enforce the domination of the two energy sources (19); however, there is some recent evidence that with increasing temperatures come increasing methane releases from the

deep sediments offshore, which may have an even more serious impact on the climate than CO_2 releases (14).

But, by moving away from burning coal, the transitioning to additional nuclear power systems in the form of either large-scale plants or in the form of small modular reactors that will soon be delivered on a trailer truck or rail-road car, will finally come into their own, driven by the merits of their economy and outstanding safety record (15 and 16). The transition from burning coal to other reliable, base-load energy sources (like natural gas and nuclear power) will likely be slow because industry cannot change quickly unless companies are placed on an emergency footing by government (17). However, a large number of coal-fired plants are still in the planning stage for construction in the U.S. (18). So, such changes in our selection of energy sources may not become widespread in this decade, but they certainly will become apparent in the decades beyond.

Competition between energy sources should be encouraged as long as the selection is based on economics and environmental factors. But media bias will continue to try to scare us, to stampede us, and to turn us politically toward one extreme or the other in making our decisions on energy sources and other current issues. Like it or not, this is a characteristic of a democratic society protected under the U.S. Constitution and the Bill of Rights. But this assumes that competition is undertaken for the benefit of vested interests, not necessarily for the common good. This also assumes that a democratic society will be enlightened and well-educated regarding important matters affecting the common good. But new forms of monitoring public opinion are developing (20), and the old prejudices, fears and agendas will be working on the general public as well (21). Unless, that is, they learn how easily otherwise well-meaning individuals can become technologically and politically memed by opposing and polarizing interests that benefit the few.

But like the balance needed between industry and the environment, the balance also needs to be understood between the common good and those who are the engines of our society. Although confronted by risk, they place their confidence in science and technology, and in the rational selections that are realized. The real challenge of the future is to incorporate and integrate the society's primary resource, its people, into the technological solutions. The former cannot exclude the latter or our society will sooner or later become overloaded and the democratic systems will no longer function as anticipated.

From a historical perspective, this may be why democratic systems have not lasted but a few hundred years; natural self-interest in opposition to the common good suggests that social capitalism may be incompatible within a social democracy. New approaches and modifications to the existing attitudes are clearly needed in industry, the government, and in the people of America who are first and foremost the engines of our society. We must find ways for all citizens to contribute to the American society. The challenge to all Americans then is to begin now to develop the solutions to this apparent conflict of attitudes within the people of industry and the government so together, the U.S., in partnership with other like-minded nations in the world, can contribute to real and lasting progress in the decades ahead.

See References List (here).

Mr. Campbell's Summary Biography (here).