Nuclear-Generated Electricity Overshadows Government-Subsidized Wind and Solar

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Free enterprise provides the least expensive electricity.

In the 21st century, there is one thing that all countries and their governments, regardless of ideology, have in common: The standard of living in that country is directly a function of the availability of electricity.

Without the availability of reliable, continuous, uninterruptible, abundant electricity to power factory machinery and keep homes, offices, hospitals, and schools warm and bright, that society will suffer in its productivity and its aspirations.

In this country demand for electricity is expected to increase by 25% in the next 25 years. This increase is a function of the demands of an expanding economy and a growing population. And that 25% does not account for artificial intelligence or electric vehicle battery charging demands, which might add an additional 60% increase.

Besides being reliable and abundant, there are other traits that are desired in the sources of electricity.

- Available on demand 24/7.

- Safe for both the public and the electrical plant workers,
- Relatively inexpensive,
- Environmentally benign with minimal footprint requirements and zero emissions.

Recently, the concern for the environment has resulted in the promotion of so-called renewables, such as solar panels and wind turbines. Thus, a look at the traits of solar panels and wind turbines.

- Without government subsidies, wind and solar sources of electricity cannot compete with other sources.
- Of the more than 400,000 wind turbines installed worldwide, virtually NONE has been financed solely with private investment money.
- They are 100% dependent on favorable weather conditions; thus, their electricity is NOT available on demand 24/7.
- Wind and solar, like hydro, coal, natural gas, and nuclear, are ALL built with the products, components, and equipment that are made from oil derivatives manufactured from crude oil, thus all electricity comes AFTER oil.
- Massive Land Use Requirements: Wind and solar power require up to 10 times more land per unit of electricity than coal or natural gas.
- Wildlife and Habitat Impacts: Wind turbines are linked to habitat fragmentation and harm to bird, bat, and potentially whale populations, while solar farms displace wildlife and disrupt migratory patterns.
- Material and Mining Concerns: Solar panels, wind turbines, and batteries depend heavily on critical minerals often mined in countries with poor environmental and labor standards.
- Limited Lifespan and Recycling Challenges: Wind and solar infrastructure have shorter lifespans (20–25 years) than natural gas (40 years) or nuclear plants (40–80 years).
- Perhaps the most damming aspect of wind and solar as a

source of electricity is their unreliability. A so-called "dunkelflaute" in Germany reduces the installed wind and solar capacities of 174 GW to only one GW, and this can last for several days.

- Unlike nuclear plants, neither wind nor solar are required to pay for their disposition or clean-up upfront. Decommissioned materials are rarely recycled and often end up in landfills. Ratepayers will have to pick up that bill after their useful life.

The merits of nuclear power to produce electricity overshadow government-subsidized electricity generation from wind and solar.

- Nuclear production of electricity is environmentally benign, reliable, affordable, land-efficient and generating zero emissions.
- Nuclear power is energy dense by comparison to other sources of electricity. One fuel pellet, the size of a finger to its first bend (approximately one inch long and a little more than a quarter inch in diameter), equals 120 gallons of oil, one ton of coal, or seventeen thousand cubic feet of natural gas.
- Nuclear power has no detrimental impact on the environment, with no hazardous discharges.

A major trait of nuclear-generated electricity is that it is safe.

- The U.S. Navy has a 70-year record with ALL its aircraft carriers and submarines being powered by nuclear, with no fatalities or accidents.
- No American citizen has ever been harmed by nuclear, something no other energy source can say.
- The operators, engineers, maintenance personnel, and others at the nuclear plants are the most tightly screened and monitored workforce anywhere.
- They are highly trained and value safety and quality over production, schedule, and cost.

- They practice what is called a Safety Conscious Work Environment (SCWE) where any employee can bring up any issue without fear of retribution and with confidence that the concern or suggestion will be evaluated on only its merit.
- The plant design and work practices at Chernobyl would not be licensed or permitted in the United States.
- The Institute for Nuclear Power Operations (INPO), created after Three Mile Island, has promoted the sharing of best practices and lessons learned between the nuclear utilities.
- INPO provides second oversight in addition to scrutiny of the Nuclear Regulatory Commission (NRC).
- Additionally, all nuclear power plants must pass reviews by the Federal Emergency Management Agency (FEMA) proving they can respond and mitigate a highly unlikely nuclear accident.
- A key advantage of nuclear power plants is their long life. Roughly three times longer than wind or solar. The wind turbines max out at 10 years of life.

That so-called nuclear waste, commonly referred to as Slightly Used Nuclear Fuel (SUNF), is a non-issue since there is very little of it produced during power operation. The spent fuel is presently being safely stored on various nuclear plant sites.

The nuclear fuel assemblies are removed from the reactor with approximately 95% of their uranium load still available. This is done based on very conservative calculations of irradiation stress of the zirconium rods that house the fuel pellets. The fuel assemblies are removed before they can experience stress cracking and leak fission fragments to the primary coolant. (Even if that were to happen, there are still two more barriers between the primary system and atmosphere.)

When we finally start to recycle and reprocess the spent fuel assemblies (SUNF) using fast-reactor technology, most of the

uranium and actinides will be converted to power and very valuable, short-lived fission products. Fast-reactor recycling of SUNF will extend our fuel supplies for several centuries. When adding the stockpiled, depleted uranium as fast-reactor fuel, power production could be extended almost indefinitely.

The next generation of reactors, usually referred to as GEN IV reactors, provides additional safety considerations over the present GEN III reactor designs. Passive shutdown characteristics, much lower operating pressures, and even the use of eutectic primary cooling should make these reactors much less expensive due to less robust containments and fewer redundant safety systems. Applications to Small Modular Reactor (SMR), factory construction and assembly, underground construction, and other considerations should lower costs considerably. Reducing the time to operation will increase the realization of the revenue stream.

There are several challenges, including enhancing enrichment capabilities, domestic uranium mining, revitalizing the supply chain, and ensuring quality assurance, that would be solved if we would just go to a free enterprise system. Additionally, streamlining regulations, augmenting the workforce, and educating the public about the benefits and safety of nuclear power would be beneficial.

The one thing that is needed is a cogent, consistent, coherent national electricity strategy, a plan that bridges regime changes and has bipartisan support. Our leaders need to recognize the importance of an electricity strategy that supports a robust, stable, and resilient electrical grid and electricity supply to our overall well-being and security. Nuclear-generated electricity, which is fundamental to a secure future and an increasing standard of living for America, is by far the best choice but the biggest detriment (other than the NRC) is government involvement.

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[BIO: David Amerine is a United States Naval Academy graduate. He served as the President of Nuclear Fuel Services, which is vital to national security as the sole producer of fuel for our nuclear Navy, brought in to lead its recovery from an NRC mandated suspension of operations. Today, David continues to advise top nuclear agencies and organizations, and is a sought-after consultant, coach, and speaker.]

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