

## 2016 Stock Market Crash

\$5 Bill Reveals Why the Economy is About to Collapse. Shocking Proof!



**Jude Clemente** Contributor

*I cover oil, gas, power, LNG markets, linking to human development*

Opinions expressed by Forbes Contributors are their own.

ENERGY | 9/05/2016 @ 7:24PM | 6,583 views

# Nuclear Electricity's Bright Future



The Palo Verde Nuclear Power Plant in Arizona is the largest power plant in the U.S. by net generation. Source: AMWUA

As a non-carbon source of baseload energy, it will be virtually impossible to meet climate change and environmental goals without a major expansion of nuclear energy. Today, nuclear accounts for 5% of global energy supply and 11% of electricity but is 0% of CO2 emissions.

Nuclear faces a bright future under both IEA World Energy Model's Reference Case and the 450 Scenario, the latter setting "an energy pathway consistent with the goal of limiting the global increase in temperature to 2°C by limiting concentration of greenhouse gases in the atmosphere to around 450 parts per million of CO2." And bear in mind that if the very high expectations for wind and solar don't come to pass, the contribution of nuclear power will be even greater than anticipated.

Indeed, it's quite clear that the more ambitious CO2 reduction goals become, the greater role nuclear energy assumes. This is why scientist Dr. James Hanson, the "Father of Global Warming," says:

- "Nuclear power, particularly next-generation nuclear power with a closed fuel cycle (where spent fuel is reprocessed), is uniquely scalable, and environmentally advantageous. Over the past 50 years, nuclear power stations – by offsetting fossil fuel combustion – have avoided the emission

### 7 Retirement Mistakes Guide

Whether you have saved \$50,000 or \$5,000,000 towards retirement, download the guide written by the Financial Engines retirement experts. It's called "7 Retirement Mistakes you can't afford to make".

 [Download My Free Guide](#)

Financial Engines®

**More coverage.  
Less spendage.**

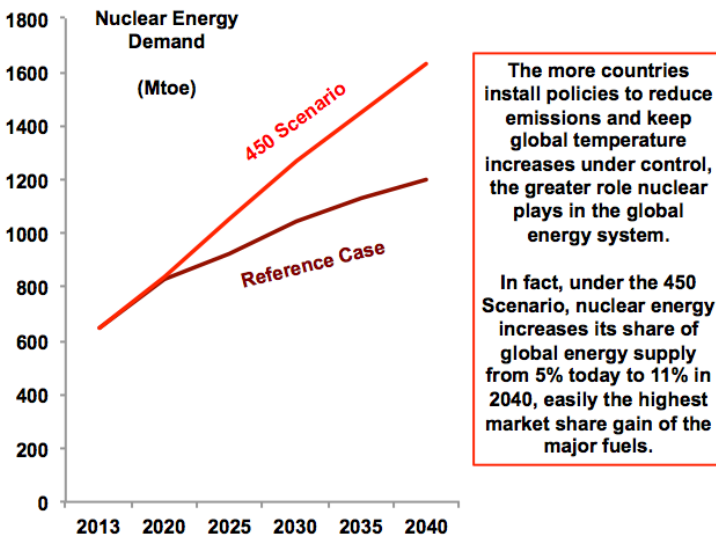
**Combine  
Auto & Renters.**

[Get A Quote](#)

 **State Farm®**

of an estimated 60bn tonnes of carbon dioxide.  
Nuclear energy can power whole civilizations,”  
[\(here\)](#)

## Higher CO2 Emission Reduction Goals Favor Nuclear



Sources: IEA; JTC

All 715 Mtoe of nuclear energy consumed this year will be to generate electricity, the cornerstone of modernity where [“more is better”](#) (read that link, it could be the most important article I’ve ever written). Thus, nuclear competes solely in the most vital energy market there is. Electrification, don’t forget, was named the Greatest Engineering Achievement of the 20th Century. Today, over 30 countries utilize nuclear power, and there are 445 nuclear reactors around the world. Some 65 new nuclear plants are under construction in 15 countries.

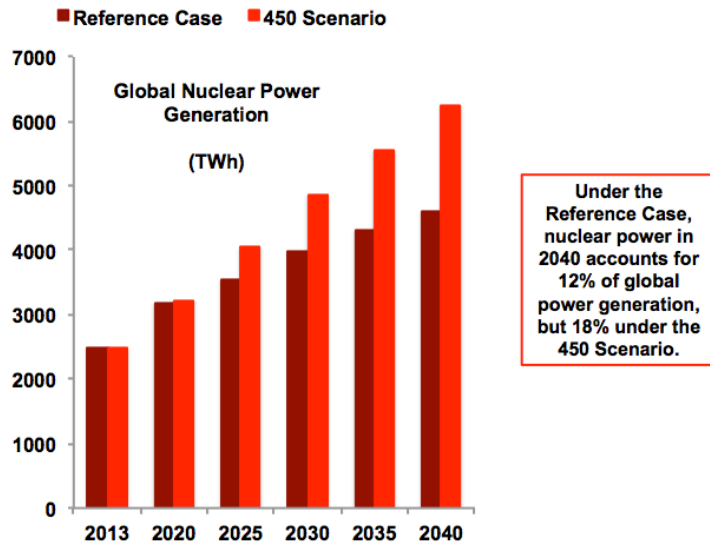
The evidence shows that nuclear power has been a safe means of generating electricity for over six decades. The accident risk is low and declining. In the 50-year history of civil nuclear power generation and more than 16,000 reactor-years of operation, there have been three significant accidents in the 60-year history of civil nuclear power generation: Three Mile Island (Pennsylvania, USA 1979), Chernobyl (Ukraine 1986), and Fukushima (Japan 2011).

Per OECD: “Even though nuclear power is perceived as a high risk, comparison with other energy sources shows far fewer fatalities ” [\(here\)](#).

More nuclear power is critical because it would drastically reduce emissions in the power sector, which accounts for nearly 45% of all global CO2 emissions. Take California, the largest U.S. economy and the U.S. Environmental Protection Agency’s model to reduce emissions. California will be hard pressed to meet its emission reduction goals with the shutdown of San Onofre Nuclear Generating Station (SONGS) in 2013 and now the planned closure of Diablo Canyon Nuclear Power Plant in 2025.

SONGS provided about 20% of the power to large portions of Southern California, huge amounts of baseload, carbon-free electricity that has now been removed from the system. **“We are supposed to be adding zero carbon sources, not subtracting or simply replacing by building to just kind of tread water.”** warns the U.S. Secretary of Energy, Dr. Ernest Moniz.

### Higher CO2 Emission Reduction Goals Favor Nuclear



Sources: IEA; JTC

Nuclear power stations are the workhorses of the electricity system, relentlessly churning out electricity day and night, year in and year out. Nuclear power provides continuous and reliable electricity production, which crucially allows for the expansion of other forms of power generation that operate intermittently, namely wind and solar. Nuclear as a backup for renewables is significant because it maintains no-carbon production.

**Advanced nuclear plants** have uniquely high capacity factors of 90% and above and are the dispatchable sources of energy that can be utilized on demand. Nuclear plants are now expected to operate for 60 years and even longer in the future. This dependability gives nuclear a clear advantage over wind and solar in our national and global goal to cut GHG emissions. **“China-U.S. cooperation to advance nuclear power.”**

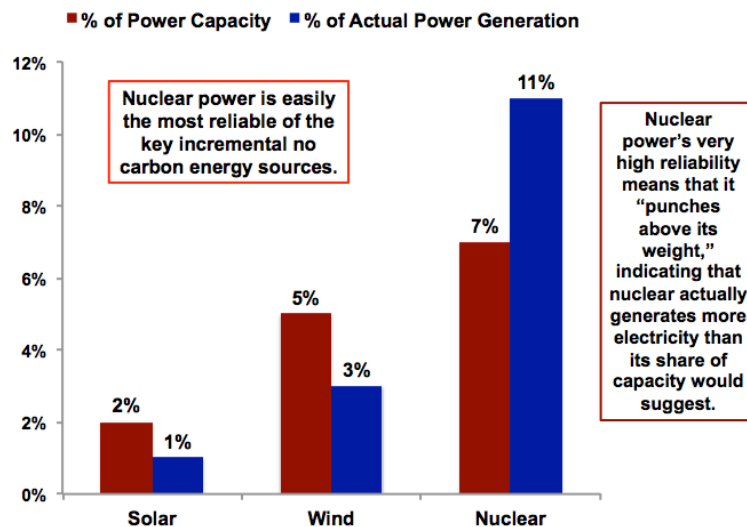
To illustrate, just take the European Union, which has become the cited model for climate change policies. The EU has been installing the best nuclear plants, and nuclear now actually generates 28% of power, but accounts for just 13% of power capacity, a “punching above its weight” that verifies nuclear’s awesomely high reliability. In France, nuclear generates a whopping 75-80% of power.

Indeed, beyond being carbon-free, nuclear generates massive amounts of power. Arizona’s Palo Verde Nuclear Power Plant, for instance, is the largest power plant in the U.S. by net

generation. All three Palo Verde units individually ranked among the top six producers in the country, generating a combined 30-35 TWh a year and serving the needs of four million people. This is as much power as generated by the state of Massachusetts, from all sources.

Globally, the average nuclear power plant provides about 5.7 TWh of electricity, which would take 2,000 modern wind turbines to generate. But, the more technologically-advanced U.S. shows what could and should be: the average nuclear plant in the U.S. pumps out 8 TWh per year, or more than 40% above the global average.

### **Nuclear is More Reliable Than Wind or Solar (Global Power Market)**



Sources: IEA; JTC

China and India, of course, will be leading the race for increasing amounts of nuclear power. And Accenture reports nuclear is much cheaper in Asia. These emerging giants realize the importance of more electricity: Indians still use just 5% and Chinese 30% of the electricity that we Americans use.

There is a fundamental attractiveness to use as much nuclear energy as possible. There are still drastic power shortages in China and especially India that block economic growth and the improvement of national living standards. And very importantly, more nuclear power would immediately help upgrade urban air quality, India's cities swell by 12-15 million people a year and China's by 18-20 million.

By 2050, India wants 25-30% of its energy to come from nuclear, a boom from 2% today. Westinghouse plans to build six reactors in India by 2030, with an estimated total cost of \$20 billion. The nuclear build-out couldn't come soon enough: over 700 million Indians lack access to modern energy ([here](#)).

China has 33 nuclear reactors operating with a capacity of 29,000 MW and 23 new plants under construction with a capacity of 23,000 MW. [“China Shows How to Build Nuclear Reactors Fast and Cheap.”](#) And “it seems as though 5 years and about \$2 billion per reactor has become routine for China.” China is expected to about double its nuclear capacity by 2020 alone.

The developing nations like China and India will be helped by the creation of the very important Small Modular Reactors (SMRs) market, which installs smaller size units of 300 MW or less that can be easily transported by truck or rail.

SMRs are critical because they can be built faster, which significantly cuts costs: the longer a nuclear plant takes to build, the more it costs. This short construction phase of SMRs make them attractive for investors because they can start to generate revenues in less than three years ([here](#)).

In short, nuclear power gains market share the more a country evolves and becomes more developed. This is a very vital concept because all countries seek to “evolve and become more developed.” For example, in the OECD, which encompasses the richest nations, nuclear is nearly 20% of power. But, in the non-OECD, which encompasses the poorest nations, nuclear is only 4% of power. Thus, nuclear power can only grow.

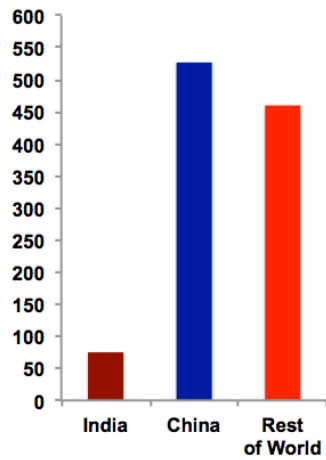
In a world where 6 in every 7 humans still live in an undeveloped nation, and literally billions of people still suffer from a lack of adequate access to power, policies that benefit an expansion of carbon-free and highly reliable nuclear electricity must become the norm.

I’d argue the world’s greatest problem: every day, desperate Sub-Saharan Africa, for instance, adds 68,000 children that don’t have access to electricity.

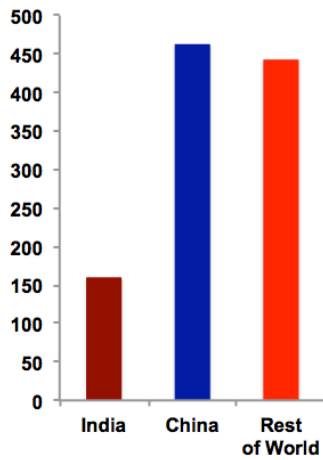
Fortunately, the world has a 100-year supply of uranium, compared to 51 years for oil and 53 years for natural gas, although I’ve already shown how “proven reserves” is a scarily oversimplified concept ([here](#)). Indeed, even 100 years is an underestimation of future uranium supply, which will continually increase as exploration continues: proven global uranium resources increased by at least 25% in the last decade due to increased mineral exploration.

**China and India Lead the Race to More Nuclear Power...**

Incremental Nuclear Power, 2013-2025 (Twh)

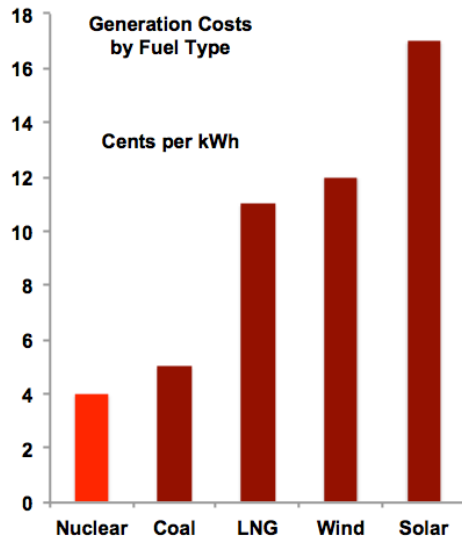


Incremental Nuclear Power, 2025-2040 (Twh)



Sources: IEA; JTC

### Because Nuclear is Carbon-Free AND Cheaper



The importance of low cost electricity like nuclear in the developing world is very clear.

Poor people have a harder time absorbing higher costs, and the developing nations are falling further into debt by \$300-400 billion per year.

Sources: Accenture; JTC

### RECOMMENDED BY FORBES

[The Richest Person In Every State](#)

[PS4 Pro's Missing 4K Blu-ray Drive: The Mistake Sony Had To Make](#)