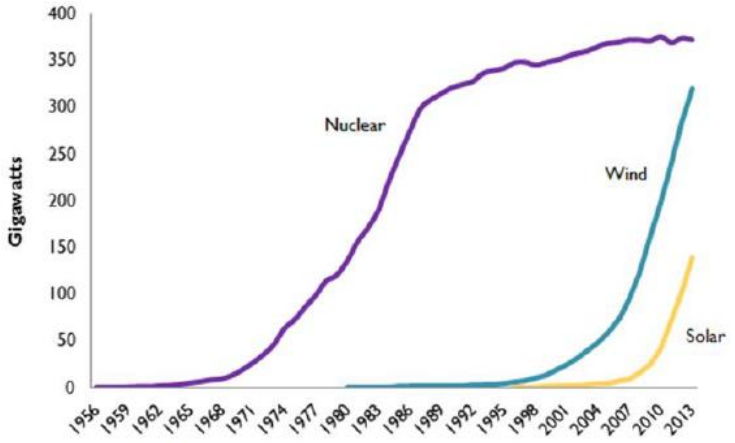
Renewables catching up with nuclear power: surprised?—Perry Sioshansi's Letter from America

At current growth rates, renewables will dwarf nuclear power in time; fossil fuels will take longer.

"Advocates of nuclear energy have long been predicting its renaissance, yet this mode of producing electricity has been stalled for years. Renewable energy, by contrast, continues to expand rapidly, even if it still has a long way to go to catch up with fossil fuel power plants." That, in a nutshell, is the compelling message of a recently released report by Worldwatch Institute's senior researcher Michael Renner.

Nuclear's best years are behind us

World nuclear, wind and solar generating capacity, 1956-2013



Source: Worldwatch Institute

It is often said that a picture is worth a thousand words. The graph opposite is no exception. It chronicles the stunning growth of wind starting in late 1990s, followed by even more dramatic rise of solar power in 2000s, while nuclear exhibits virtually no growth in the past decade after a period of sustained growth starting in 1970s.

Another way to compare the relative rise of wind, solar and nuclear power is to look at the pace of growth from the time these technologies became commercially viable. The rise of solar is far more dramatic than nuclear or wind, which is one reason many predict that the sun will become the dominant form of electricity generation by 2050.

Nuclear plants, of course, enjoy two characteristics that make them particularly attractive:

- first, nuclear reactors typically operate at extremely high load factors, usually in the 85-90%+ range. That means that a 1,000MW nuclear reactor operating 90% of the time at full capacity will generate a great number of MWh. Solar and wind, on the other hand are intermittent by definition, operating at much lower capacity factors, typically in the 20% range for most windfarms. That means that a 1,000MW windfarm generates roughly a quarter or a fifth as many MWh as a nuclear plant, all else being equal; and
- second, nuclear power is highly compact, which means it has extremely small footprint relative to wind and solar, which by definition are diffused, requiring vast amounts of land to produce equal amount of output.

The first advantage means that the existing installed nuclear capacity generates far more power than wind and solar combined. But given the relative rates of growth of nuclear vs. wind and solar suggests that it is only a matter of time before renewable generation catches up with nuclear power. Renewables, of course, are not limited to wind and solar but include significant amounts of hydro, geothermal, biomass, biogas and tidal energy.

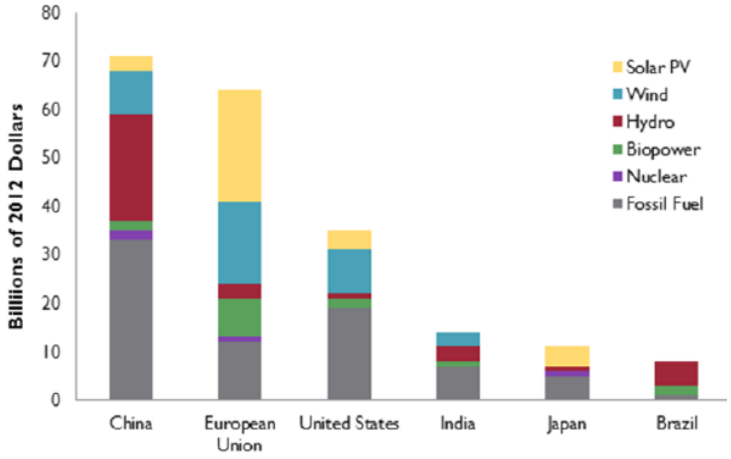
Despite these advantages, nuclear has not fared well relative to competing forms of generation in major markets world-wide, as illustrated in the graph below for the period 2000-13.

Worldwatch Institute's report points out that nuclear energy's share of global power production has steadily *declined*, from a peak of 17.6% in 1996 to 10.8% in 2013. Renewables, by contrast, increased their share from 18.7% in 2000 to 22.7% in 2012, a trend that is expected to accelerate over time.

Following a rapid rise from in the mid-1950s, global nuclear power generating capacity peaked at 375.3GW in 2010, declining to 371.8GW in 2013, according to the International Atomic Energy Agency.

Where is the nuclear renaissance?

Average annual investments in power generation



Source: IEA

Among renewables, hydropower is the leading source of electricity generation accounting for 16.5% of global power in 2012. Wind and solar's current contribution at 3.4% and 0.6%, respectively, is miniscule. Yet they are growing at a fast clip. Between 2000-2012, wind power grew nearly 16-fold and solar jumped 49-fold, albeit from a small base.

What are the prospects for renewables catching up with conventional technologies? Worldwatch Institute's report says: "The chances of a nuclear revival seem slim. Renewable energy, by contrast, appears to be on the right track. But it is clear that renewables have a long way to go before they can hope to supplant fossil fuels as the planet's principal electricity source."

The report's parting words? "The (future) expansion of sources like wind and solar will have to become even more rapid in order to stave off climate disaster, and that in turn means that their fate cannot be left to the whims of the market alone."

Perry Sioshansi is a specialist in electricity sector restructuring. He is founder and president of Menlo Energy Economics and is the editor and publisher of EEnergy Informer, from which we have sourced this article, and which we commend.