

From Fukushima to San Onofre, doubts about nuclear power's future viability

By [Ron Meador](#) | 07/17/12



REUTERS

The San Onofre nuclear plant in San Diego County has been plagued by equipment degradation.

My hat is off this week to Ray Henry and the Associated Press for [a remarkable, document-driven examination](#) of cost overruns, construction delays and manufacturing screw-ups at three power plants on the leading edge of America's so-called "nuclear renaissance."

The scenarios of manufacturers delivering wrong parts and utilities keeping flawed employee files might be comical if these projects were shopping malls or football stadiums. But because the billions consumed by these budget-busters must be borne by ratepayers (and sometimes taxpayers) – and because the ultimate question of public safety hangs over pretty much every aspect of a nuclear plant – Henry's account is sobering to say the least.

Five reactors are now under construction at three plants near Waynesboro, Ga.; Jenkinsville, S.C.; and Spring City, Tenn. They are the first to be built anywhere in the United States since 1996, when another reactor at the Tennessee plant was completed. Some highlights, or lowlights, of how it's all going:

- The Georgia plant has already gone \$800 million over budget for the first of two reactors, in a \$14 billion plant that's still more than four years from its predicted completion date.
- At the Tennessee plant, the second reactor's cost has nearly doubled in estimated cost, from \$2.5 billion to perhaps \$4.5 billion, and the target date for completion has been pushed back from 2012 to 2015.
- In South Carolina, construction costs have jumped \$670 million over the \$10.5 billion budget, and completion has been pushed back from 2016 to 2017. However, the owners say that they've saved enough on labor and interest to offset the overruns, and that the second reactor will be done ahead of schedule.
- Groundbreaking for a fourth new plant, a two-reactor facility in Florida, has been postponed because slack demand for power and low prices for natural gas have made it economically unattractive.
- Still other utilities say they won't move forward with new plants until they see how the U.S. Nuclear Regulatory Commission rewrites safety rules in response to lessons learned from the meltdowns at Fukushima last year.

It's worth remembering that busted budgets and retreating timetables are typical for U.S. nuclear plants throughout their history. As Henry summarizes the last big surge of plant construction, in the 1970s:

Electric companies overestimated demand and designed plants they didn't need. They had trouble managing massive construction workforces. Utilities designed nuclear plants as they built [them], leading to mistakes and slowdowns. Interest rates skyrocketed and the 1979 meltdown at the Three Mile Island nuclear plant in Pennsylvania forced plant operators to meet new rules at additional costs.

It's also worth remembering that in the U.S. this method of making electricity – which proponents still call the safest, cheapest, cleanest option available – has required the federal government to step up in place of private underwriters and/or lenders who find the financial risks too high without special guarantees from Washington.

Giving nuclear a fair shake

I have said in this space before, and sincerely, that I am not an antinuclear zealot. I agree with the pro-nuke folks that the disease and deaths fairly attributable to electricity made from coal and gas are unfairly omitted, often, from the calculus of nuclear power's risk to public health.

I agree that its potential to reduce greenhouse gas emissions is a big plus, even if you count – as proponents, often, do not – the fossil-fuel consumption attributable to various phases of building and running these plants, apart from reactor operation itself.

And while I'm as appalled as anyone at the amounts of spent fuel we've piled up all around the country, I think we have to acknowledge that putting three or six or 12 more plants online isn't going to make this terrible, apparently unsolvable problem of waste disposal dramatically worse.

But then there's Fukushima, a game-changing event whose implications are still unfolding.

The pro-nuke side had a year and more to write off the meltdowns in Japan as a freak event driven by a earthquake/tsunami scenario that is virtually unimaginable at America's nuclear generating stations, and to point out with tiresome frequency that nobody had (yet) perished as a consequence.

Then came the retrospective examinations which made abundantly clear that the massive evacuation and three-decade decontamination program required by Fukushima could have been much, much worse but for a series of lucky breaks, weather- and otherwise.

Moreover, a parliamentary commission in Japan has now concluded that earthquake damage alone might have induced the equipment failures that led to meltdown, with the tsunami actually masking the true cause. This is significant to Americans who recognize that while we may not have to worry about tsunamis much, earthquakes are a different matter.

According to the [New York Times account](#):

The 641-page report criticized [Tokyo Electric Power Co., the plant operator] as being too quick to dismiss earthquake damage as a cause of the fuel meltdowns at three of the plant's six reactors, which overheated when the site lost power. Tepco has contended that the plant withstood the earthquake that rocked eastern Japan, instead placing blame for the disaster on what some experts have called a "once in a millennium" tsunami that followed. Such a rare calamity was beyond the scope of contingency planning, Tepco executives have suggested, and was unlikely to pose a threat to Japan's other nuclear reactors in the foreseeable future....

The commission also accused the government, Tepco and nuclear regulators of failing to carry out basic safety measures despite being aware of the risks posed by earthquakes, tsunamis and other events that might cut off power systems. Even though the government-appointed Nuclear Safety Commission revised earthquake resistance standards in 2006 and ordered nuclear operators around the country to inspect their reactors, for example, Tepco did not carry out any checks, and regulators did not follow up, the report said.

The report placed blame for the tepid response on collusion between the company, the government and regulators, saying they had all “betrayed the nation’s right to safety from nuclear accidents.” Tepco “manipulated its cozy relationship with regulators to take the teeth out of regulations,” the report said.

Failures after a year on line

Of course, allegations of excessive coziness between nuke-plant operators and regulators are commonplace in this country, too, and they come to mind as one considers the current woes of the San Onofre plant near San Diego, where rebuilt equipment put into service in 2010 and 2011 has already been taken offline because of unexpectedly rapid wear.

Much of the mainstream coverage has been devoted to complicated statistics about “thinning” rates in the reactors’ steam tubes, one of which leaked radioactive vapor and prompted the plant’s shutdown last Jan. 31. A typical passage from Saturday’s [Los Angeles Times](#):

The data released by the [U.S. Nuclear Regulatory Commission] showed that a total of 3,401 tubes in the Unit 2 and Unit 3 reactors — 8.7% of the 38,908 total tubes in the plant’s four steam generators — had shown some signs of wear....

Of the tubes with wear, 387 — about 1% of the total — had portions that had worn through by 35% or more. At that level of wear, industry standards require the tubes to be plugged and taken out of service. In addition to the tubes plugged because of excessive wear, Edison plugged another 930 that were in the same area as the deteriorated tubes, as a precautionary measure.

Generally, once 8% of a plant’s tubes are plugged, it must run at a lower power level.

But for answers to the big question – how can this kind of rapid deterioration happen in the first place? – the Times had to rely on a leaked analysis prepared by the plant operator, Southern California Edison:

According to the analysis, while designing the new steam generators, [Mitsubishi Heavy Industries] input parameters like fluid temperatures, flow rates from the primary side of the reactor system and steam generator dimensions and used a number of computer codes, some developed by Mitsubishi, in various phases of analysis, to predict whether the tubes would experience vibration issues. The reason that the design codes and assumptions did not accurately predict the issues that arose is not fully understood, the report said.

Oops. Not the kind of problem, even if fully understood, that you want to have in a power plant the ratepayers just put up \$671 million to refurbish.

But it is just the kind of problem to move the [Times’ editorial page](#) to ask the central question facing all Americans: Is there any nuclear future available to us that *doesn’t* require betting huge amounts of dough on unforeseeable risks and unreliable regulators?

As the NRC continues its probe of San Onofre, among the issues it will examine is whether Edison officials accurately characterized the new steam generators, which were installed in 2010 and 2011, when they said they were nearly identical to the old ones. That set the stage for a streamlined approval process. Now it appears that the design might not have been so similar after all. Hundreds more tubes

were added in Unit 3, and the shape of the support structure for those tubes also was redesigned. The modified structure was intended to improve performance, but any significant change calls for stringent regulatory oversight. The NRC also should be examining its own actions in this regard; Edison shared the design changes with the nuclear agency, which should bear responsibility if it failed to insist on the proper level of scrutiny....

The decision about whether to start up the reactors is essentially an engineering issue. But the bigger policy question for both Edison and regulators is the long-term future of the aging plant. San Onofre's two current reactors have been operating since 1983 and '84, respectively; the license for both expires in 2022.... Edison says it has not yet determined whether to seek a 20-year license extension, a process that it would have to begin in 2017 to be completed in time.

It should not. Instead of spending the next five years figuring out how to keep the plant going indefinitely, Edison should be using that time to develop other ways to generate the needed power, especially from reliable, sustainable sources such as solar and wind.
