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Dear readers of the WISE/NIRS Nuclear Monitor,

In this issue of the Monitor:

- A deconstruction of climate scientist James Hansen's Generation IV nuclear fallacies and fantasies.
- Ed Lyman from the Union of Concerned Scientists writes about failed attempts to use pyroprocessing to treat spent fuel from an integral fast reactor prototype.
- M.V. Ramana writes about plans for small modular reactors in Canada.
- We continue our detailed coverage of the Toshiba / Westinghouse crisis as both companies fight for survival.
- We write about efforts to revive the abandoned AP1000 reactor project in South Carolina, and the blame game as everyone blames everyone else for the US$10 billion fiasco.

Feel free to contact us if you have feedback on this issue of the Monitor, or if there are topics you would like to see covered in future issues.

Regards from the editorial team.

Email: monitor@wiseinternational.org

Monitored this issue:

Don't Nuke the Climate!

Public subsidies in connection with the international effort to combat climate change are first and foremost meant to support the just transition of the energy system towards energy savings and renewables in countries of the Global South that are most impacted by the effects of global warming (mitigation). They are also needed to help these countries to finance infrastructure and projects to cope with the impacts of climate change (adaptation).

The Green Climate Fund, a fund within the framework of the UNFCCC, was set up to assist developing countries in adaptation and mitigation practices to counter global warming. The aim is to raise US$100 billion per year by 2020, thus creating a major pot of public money.

The nuclear industry openly states that it wants to get its hands on money from this fund. No nuclear project has been put forward for approval – yet. But with public money / state aid granted for nuclear projects in the UK (Hinkley Point) and Hungary (Paks II), it will only be a matter of time before the nuclear industry puts forward specific projects seeking funding from the Green Climate Fund.

We must not let nuclear take away the much-needed resources from the Green Climate Fund and other public funds that are meant for climate change adaptation and mitigation. Organisations from all corners of the globe have formed the Don't Nuke the Climate Alliance and are working on an action plan towards the COP23 in Bonn, Germany, November 2017. We will take action, organise workshops and gatherings, lobby inside and outside and publish new materials.

We ask organisations to sign the petition: www.dont-nuke-the-climate.org/sign/

More information: www.dont-nuke-the-climate.org

James Hansen's Generation IV nuclear fallacies and fantasies

Author: *Jim Green – Nuclear Monitor editor*

NM849.4670 The two young co-founders of nuclear engineering start-up Transatomic Power were embarrassed earlier this year when their claims about their molten salt reactor design were debunked, forcing some major retractions.[1]

The claims of MIT nuclear engineering graduate students – Leslie Dewan and Mark Massie – were trumpeted in MIT's *Technology Review* under the headline, 'What if we could build a nuclear reactor that costs half as much, consumes nuclear waste, and will never melt down?'[2]

The *Technology Review* puff-piece said Dewan "introduced new materials and a new shape that allowed her to increase power output by 30 times. As a result, the reactor is now so compact that a version large enough for a power plant can be built in a factory and shipped by rail to a plant site, which is potentially cheaper than the current practice of building nuclear reactors on site. The reactor also makes more efficient use of the energy in nuclear fuel. It can consume about one ton of nuclear waste a year, leaving just four kilograms behind. Dewan's name for the technology: the Waste-Annihilating Molten-Salt Reactor."[2]

A February 2017 article in MIT's *Technology Review* – this one far more critical – said: "Those lofty claims helped it raise millions in venture capital, secure a series of glowing media profiles (including in this publication), and draw a rock-star lineup of technical advisors."[1]

MIT physics professor Kord Smith debunked a number of Transatomic's key claims. Smith says he asked Transatomic to run a test which, he says, confirmed that "their claims were completely untrue."[1]

Transatomic's claim that the 'Waste-Annihilating Molten-Salt Reactor' could "generate up to 75 times more electricity per ton of mined uranium than a light-water reactor" was severely downgraded to "more than twice."[1] And the company abandoned its waste-to-fuel claims and now says that a reactor based on the current design would not use waste as fuel and thus would "not reduce existing stockpiles of spent nuclear fuel".[1]

Hansen's Generation IV propaganda

Kennedy Maize wrote about Transatomic's troubles in *Power Magazine*: "[T]his was another case of technology hubris, an all-to-common malady in energy, where hyperbolic claims are frequent and technology journalists all too credulous."[3] Pro-nuclear commentator Dan Yurman said that "other start-ups with audacious claims are likely to receive similar levels of scrutiny" and that it "may have the effect of putting other nuclear energy entrepreneurs on notice that they too may get the same enhanced levels of analysis of their claims."[4]

Well, yes, others making false claims about Generation IV reactor concepts might receive similar levels of scrutiny ... or they might not. Arguably the greatest sin of the Transatomic founders was not that they inadvertently spread misinformation, but that they are young, and in Dewan's case, female. Aging men seem to have a free pass to peddle as much misinformation as they like without the public shaming that the Transatomic founders have been subjected to. A case in point is climate scientist James Hansen. We've repeatedly drawn attention to Hansen's nuclear misinformation in *Nuclear Monitor*[5-9] – but you'd struggle to find any critical commentary outside the environmental and anti-nuclear literature.

Hansen states that a total requirement of 115 new reactor start-ups per year to 2050 would be required to replace fossil fuel electricity generation – a total of about 4,000 reactors.[10] Let's assume that Generation IV reactors do the heavy lifting, and let's generously assume that mass production of Generation IV reactors begins in 2030. That would necessitate about 200 reactor start-ups per year from 2030 to 2050 – or four every week. Good luck with that.

Moreover, the assumption that mass production of Generation IV reactors might begin in or around 2030 is unrealistic. A report by the French Institute for Radiological Protection and Nuclear Safety − a government authority under the Ministries of Defense, the Environment, Industry, Research, and Health − states: "There is still much R&D to be done to develop the Generation IV nuclear reactors, as well as for the fuel cycle and the associated waste management which depends on the system chosen."[11]

Likewise, a US Government Accountability Office report on the status of small modular reactors (SMRs) and other 'advanced' reactor concepts in the US concluded: "Both light water SMRs and advanced reactors face additional challenges related to the time, cost, and uncertainty associated with developing, certifying or licensing, and deploying new reactor technology, with advanced reactor designs generally facing greater challenges than light water SMR designs. It is a multi-decade process, with costs up to $1 billion to $2 billion, to design and certify or license the reactor design, and there is an additional construction cost of several billion dollars more per power plant."[12]

An analysis recently published in the peer-reviewed literature found that the US government has wasted billions of dollars on Generation IV R&D with little to show for it.[13] Lead researcher Dr Ahmed Abdulla, from the University of California, said that "despite repeated commitments to non-light water reactors, and substantial investments ... (more than $2 billion of public money), no such design is remotely ready for deployment today."[14]

Weapons

In a nutshell, Hansen and other propagandists claim that some Generation IV reactors are a triple threat: they can convert weapons-usable (fissile) material and long-lived nuclear waste into low-carbon electricity. Let's take the weapons and waste issues in turn.

Hansen says Generation IV reactors can be made "more resistant to weapons proliferation than today's reactors"[15] and "modern nuclear technology can reduce proliferation risks".[16] But *are* new reactors being made more resistant to weapons proliferation and are they reducing proliferation risks? In a word: No. Fast neutron reactors have been used for weapons production in the past (e.g. by France[17]) and will likely be used for weapons production in future (e.g. by India).

India plans to produce weapons-grade plutonium in fast breeder reactors for use as driver fuel in thorium reactors.[18] Compared to conventional uranium reactors, India's plan is far worse on both proliferation and security grounds. To make matters worse, India refuses to place its fast breeder / thorium program under IAEA safeguards.[19]

Hansen claims that thorium-based fuel cycles are "inherently proliferation-resistant".[20] That's garbage – thorium has been used to produce fissile material (uranium-233) for nuclear weapons tests.[21] Again, India's plans provide a striking real-world refutation of Hansen's dangerous misinformation.

Hansen states that if "designed properly", fast neutron reactors would generate "nothing suitable for weapons".[20] What does that even mean? Are we meant to ignore actual and potential links between Generation IV nuclear technology and WMD proliferation on the grounds that the reactors weren't built "properly"? And if we take Hansen's statement literally, no reactors produce material suitable for weapons – the fissile material must always be separated from irradiated materials – in which case all reactors can be said to be "designed properly". Hooray.

Hansen claims that integral fast reactors (IFR) – a non-existent variant of fast neutron reactors – "could be inherently free from the risk of proliferation".[22] That's another dangerous falsehood.[23] Dr George Stanford, who worked on an IFR R&D program in the US, notes that proliferators "could do [with IFRs] what they could do with any other reactor − operate it on a special cycle to produce good quality weapons material."[24]

Hansen acknowledges that "nuclear does pose unique safety and proliferation concerns that must be addressed with strong and binding international standards and safeguards."[10] There's no doubting that the safeguards systems needs strengthening.[25] In articles and speeches during his tenure as the Director General of the IAEA from 1997–2009, Dr Mohamed ElBaradei said that the Agency's basic rights of inspection are "fairly limited", that the safeguards system suffers from "vulnerabilities" and "clearly needs reinforcement", that efforts to improve the system were "half-hearted", and that the safeguards system operated on a "shoestring budget ... comparable to that of a local police department".

Hansen says he was converted to the cause of Generation IV nuclear technology by Tom Blees, whose 2008 book 'Prescription for the Planet' argues the case for IFRs.[26] But Hansen evidently missed those sections of the book where Blees argues for radically strengthened safeguards including the creation of an international strike-force on full standby to attend promptly to any detected attempts to misuse or to divert nuclear materials. Blees also argues that "privatized nuclear power should be outlawed worldwide" and that nuclear power must either be internationalized or banned to deal with the "shadowy threat of nuclear proliferation".[26]

So what is James Hansen doing about the WMD proliferation problem and the demonstrably inadequate nuclear safeguards system? This is one of the great ironies of Hansen's nuclear advocacy – he does absolutely nothing other than making demonstrably false claims about the potential of Generation IV concepts to solve the problems, and repeatedly slagging off at organizations with a strong track record of campaigning for improvements to the safeguards system.[27]

Waste

Hansen claims that "modern nuclear technology can ... solve the waste disposal problem by burning current waste and using fuel more efficiently."[16] He elaborates: "Nuclear "waste": it is not waste, it is fuel for 4th generation reactors! Current ('slow') nuclear reactors are lightwater reactors that 'burn' less than 1% of the energy in the original uranium ore, leaving a waste pile that is radioactive for more than 10,000 years. The 4th generation reactors can 'burn' this waste, as well as excess nuclear weapons material, leaving a much smaller waste pile with radioactive half-life measured in decades rather than millennia, thus minimizing the nuclear waste problem. The economic value of current nuclear waste, if used as a fuel for 4th generation reactors, is trillions of dollars."[28]

But even if IFRs – Hansen's favored Generation IV concept – worked as hoped, they would still leave residual actinides, and long-lived fission products, and long-lived intermediate-level waste in the form of reactor and reprocessing components ... all of it requiring deep geological disposal. UC Berkeley nuclear engineer Prof. Per Peterson notes in an article published by the pro-nuclear Breakthrough Institute: "Even integral fast reactors (IFRs), which recycle most of their waste, leave behind materials that have been contaminated by transuranic elements and so cannot avoid the need to develop deep geologic disposal."[29]

So if IFRs don't obviate the need for deep geological repositories, what problem do they solve? They don't solve the WMD proliferation problem associated with nuclear power. They would make more efficient use of finite uranium ... but uranium is plentiful.

In theory, IFRs would gobble up nuclear waste and convert it into low-carbon electricity. In practice, the IFR R&D program in Idaho has left a legacy of troublesome waste. This saga is detailed in a recent article[31] and a longer report[32] by the Union of Concerned Scientists' senior scientist Ed Lyman (see the following article in this issue of *Nuclear Monitor*). Lyman states that

The EBR-II reactor in Idaho – the prototype 'integral fast reactor'.

attempts to treat IFR spent fuel with pyroprocessing have not made management and disposal of the spent fuel simpler and safer, they have "created an even bigger mess".[31]

Japan is about to get first-hand experience of the waste legacy associated with Generation IV reactors in light of the decision to decommission the Monju fast spectrum reactor. Decommissioning Monju has a hefty price-tag – far more than for conventional light-water reactors. According to a 2012 estimate by the Japan Atomic Energy Agency, decommissioning Monju will cost an estimated ¥300 billion (US$2.74bn; €2.33bn).[30] That estimate includes ¥20 billion to remove spent fuel from the reactor – but no allowance is made for the cost of disposing of the spent fuel, and in any case Japan has no deep geological repository to dispose of the waste.

Generation IV economics

Hansen claimed in 2012 that IFRs could generate electricity "at a cost per kW less than coal."[33,34] He was closer to the mark in 2008 when he said of IFRs: "I do not have the expertise or insight to evaluate the cost and technology readiness estimates" of IFR advocate Tom Blees and the "overwhelming impression that I get ... is that Blees is a great optimist."[35]

The US Government Accountability Office's 2015 report noted that technical challenges facing SMRs and advanced reactors may result in higher-cost reactors than anticipated, making them less competitive with large light-water reactors or power plants using other fuels.[36]

A 2015 pro-nuclear puff-piece by the International Energy Agency (IEA) and the OECD's Nuclear Energy Agency (NEA) arrived at the disingenuous conclusion that nuclear power is "an attractive low-carbon technology in the absence of cost overruns and with low financing costs".[37] But the IEA/NEA report made no effort to spin the economics of Generation IV nuclear concepts, stating that "generation IV technologies aim to be at least as competitive as generation III technologies ... though the additional complexity of these designs, the need to develop a specific supply chain for these reactors and the development of the associated fuel cycles will make this a challenging task."[37]

The late Michael Mariotte commented on the IEA/NEA report: "So, at best the Generation IV reactors are aiming to be as competitive as the current − and economically failing − Generation III reactors. And even realizing that inadequate goal will be "challenging." The report might as well have recommended to Generation IV developers not to bother."[38]

Of course, Hansen isn't the only person peddling misinformation about Generation IV economics. A recent report states that the "cost estimates from some advanced reactor companies – if accurate – suggest that these technologies could revolutionize the way we think about the cost, availability, and environmental consequences of energy generation."[39] To estimate the costs of Generation IV nuclear concepts, the researchers simply asked companies involved in R&D projects to supply the information!

The researchers did at least have the decency to qualify their findings: "There is inherent and significant uncertainty in projecting NOAK [nth-of-a-kind] costs from a group of companies that have not yet built a single commercial-scale demonstration reactor, let alone a first commercial plant. Without a commercial-scale plant as a reference, it is difficult to reliably estimate the costs of building out the manufacturing capacity needed to achieve the NOAK costs being reported; many questions still remain unanswered – what scale of investments will be needed to launch the supply chain; what type of capacity building will be needed for the supply chain, and so forth."[39]

Hansen has doubled down on his nuclear advocacy, undeterred by the Fukushima disaster; undeterred by the economic disasters of nuclear power in the US, the UK, France, Finland and elsewhere; and undeterred by the spectacular growth of renewables and the spectacular cost reductions. He needs to take his own advice. Peter Bradford, adjunct professor at Vermont Law School and a former US Nuclear Regulatory Commission member, said in response to a 2015 letter[10] co-authored by Hansen:[40]

"The Hansen letter contains these remarkably unself-aware sentences:

'To solve the climate problem, policy must be based on facts and not on prejudice.'

'The climate issue is too important for us to delude ourselves with wishful thinking.'

'The future of our planet and our descendants depends on basing decisions on facts, and letting go of long held biases when it comes to nuclear power.'

Amen, brother."

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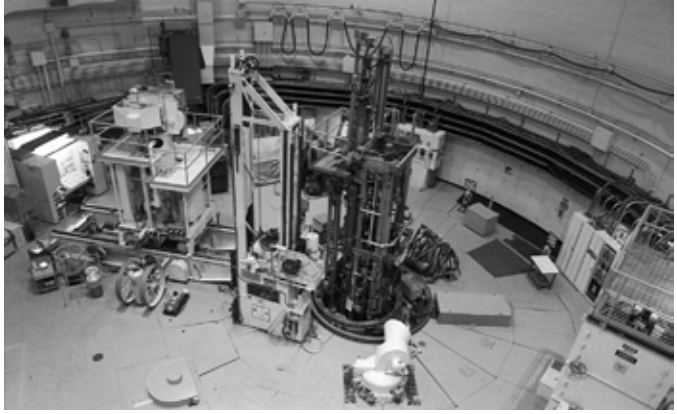
Pyroprocessing: the integral fast reactor waste fiasco



NM849.4671 In theory, integral fast reactors (IFRs) would gobble up nuclear waste and convert it into low-carbon electricity. In practice, the IFR R&D program in Idaho has left a legacy of troublesome waste. This saga is detailed in a recent article[1] and a longer report[2] by the Union of Concerned Scientists' senior scientist Ed Lyman.

Lyman notes that the IFR concept "has attracted numerous staunch advocates" but their "interest has been driven largely by idealized studies on paper and not by facts derived from actual experience."[1] He discusses the IFR prototype built at Idaho – the Experimental Breeder Reactor-II (EBR-II), which ceased operation in 1994 – and subsequent efforts by the Department of Energy (DOE) to treat 26 metric tons of "sodium-bonded" metallic spent fuel from the EBR-II reactor with pyroprocessing, ostensibly to convert the waste to forms that would be safer for disposal in a geological repository. A secondary goal was to demonstrate the viability of pyroprocessing – but the program has instead demonstrated the serious shortcomings of this technology.

Lyman writes:[1]

"Pyroprocessing is a form of spent fuel reprocessing that dissolves metal-based spent fuel in a molten salt bath (as distinguished from conventional reprocessing, which dissolves spent fuel in water-based acid solutions). Understandably, given all its problems, DOE has been reluctant to release public information on this program, which has largely operated under the radar since 2000.

"The FOIA [Freedom of Information Act] documents we obtained have revealed yet another DOE tale of vast sums of public money being wasted on an unproven technology that has fallen far short of the unrealistic projections that DOE used to sell the project to Congress, the state of Idaho and the public. However, it is not too late to pull the plug on this program, and potentially save taxpayers hundreds of millions of dollars. …

"Pyroprocessing was billed as a simpler, cheaper and more compact alternative to the conventional aqueous reprocessing plants that have been operated in France, the United Kingdom, Japan and other countries.

"Although DOE shut down the EBR-II in 1994 (the reactor part of the IFR program), it allowed work at the pyroprocessing facility to proceed. It justified this by asserting that the leftover spent fuel from the EBR-II could not be directly disposed of in the planned Yucca Mountain repository because of the potential safety issues associated with presence of metallic sodium in the spent fuel elements, which was used to "bond" the fuel to the metallic cladding that encased it. (Metallic sodium reacts violently with water and air.)

"Pyroprocessing would separate the sodium from other spent fuel constituents and neutralize it. DOE decided in 2000 to use pyroprocessing for the entire inventory of leftover EBR-II spent fuel – both "driver" and "blanket" fuel – even though it acknowledged that there were simpler methods to remove the sodium from the lightly irradiated blanket fuel, which constituted nearly 90% of the inventory.

"However, as the FOIA documents reveal in detail, the pyroprocessing technology simply has not worked well and has fallen far short of initial predictions. Although DOE initially claimed that the entire inventory would be processed by 2007, as of the end of Fiscal Year 2016, only about 15% of the roughly 26 metric tons of spent fuel had been processed. Over $210 million has been spent, at an average cost of over $60,000 per kilogram of fuel treated. At this rate, it will take until the end of the century to complete pyroprocessing of the entire inventory, at an additional cost of over $1 billion.

"But even that assumes, unrealistically, that the equipment will continue to be usable for this extended time period. Moreover, there is a significant fraction of spent fuel in storage that has degraded and may not be a candidate for pyroprocessing in any event. …

"What exactly is the pyroprocessing of this fuel accomplishing? Instead of making management and disposal of the spent fuel simpler and safer, it has created an even bigger mess. …

"[P]yroprocessing has taken one potentially difficult form of nuclear waste and converted it into multiple challenging forms of nuclear waste. DOE has spent hundreds of millions of dollars only to magnify, rather than simplify, the waste problem. This is especially outrageous in light of other FOIA documents that indicate that DOE never definitively concluded that the sodium-bonded spent fuel was unsafe to directly dispose of in the first place. But it insisted on pursuing pyroprocessing rather than conducting studies that might have shown it was unnecessary.

"Everyone with an interest in pyroprocessing should reassess their views given the real-world problems experienced in implementing the technology over the last 20 years at INL. They should also note that the variant of the process being used to treat the EBR-II spent fuel is less complex than the process that would be needed to extract plutonium and other actinides to produce fresh fuel for fast reactors. In other words, the technology is a long way from being demonstrated as a practical approach for electricity production."

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Small nuclear power reactors for Canada: Future or folly?

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NM849.4672 Nuclear energy companies are proposing small nuclear reactors as a safer and cheaper source of electricity.[1] In June, Canadian Nuclear Laboratories put out a "call for a discussion around Small Modular Reactor (SMRs) in Canada" and the role the organization "can play in bringing this technology to market."[2]

The news release asserts that SMRs are "a potential alternative to large-scale nuclear reactors," would be effective at "decreasing up-front capital costs through simpler, less complex plants" and are "inherently safe" designs.[2] All of this warrants examination.

As a physicist who has researched and written about various policy issues related to nuclear energy and different nuclear reactor designs for nearly two decades, I believe that one should be skeptical of these claims.

SMRs produce small amounts of electricity compared to currently common nuclear power reactors. In Canada, the last set of reactors commissioned were the four at Darlington, east of Toronto, which entered service between 1990 and 1993. These are designed to feed 878 megawatts into the electric grid.

In contrast, the first two nuclear power reactors commissioned in Canada were the Nuclear Power Demonstration reactor at Rolphton, Ont., in 1962, and Douglas Point, Ont., in 1968. These fed 22 and 206 megawatts respectively to the grid.

In other words, reactors have increased in size and power-generating capacity over time. For perspective, normal summer-time peak demand for electricity in Ontario is estimated at over 22,000 megawatts.[3]

Cost considerations key

The reason for the increase in reactor output is simple: Nuclear power has always been an expensive way to generate electricity. Historically, small reactors built in the United States all shut down early because they couldn't compete economically.[4] One of the few ways that nuclear power plant operators could reduce costs was to capitalize on economies of scale – taking advantage of the fact that many of the expenses associated with constructing and operating a reactor do not change in proportion to the power generated.

Building a 800-megawatt reactor requires less than four times the quantity of concrete or steel as a 200-megawatt reactor, and does not need four times as many people to operate it. But it does generate four times as much electricity, and revenue.

Small modular reactors are even smaller. The NuScale reactor being developed by NuScale Power in the United States is to feed just 47.5 megawatts into the grid.[5] This reduction is chiefly due to the main practical problem with nuclear power: reactors are expensive to build.

Consider the experience in Ontario: In 2008, the province's government asked reactor vendors to bid for the construction of two more reactors at the Darlington site. The bid from Atomic Energy of Canada Ltd. was reported to be $26 billion for two 1200-megawatt CANDU reactors – more than three times what the government had assumed.[6] The province abandoned its plans.[7]

Not surprisingly, with costs so high, few reactors are being built. The hope offered by the nuclear industry is that going back to building smaller reactors might allow more utilities to invest in them.

NuScale Power says a 12-unit version of its design that feeds 570 MW to the grid will cost "less than $3 billion."[8] But because the reactor design is far from final, the figure is not reliable. There is a long and well-documented history of reactors being much more expensive than originally projected.[9] This year, Westinghouse Electric Company – historically the largest builder of nuclear power plants in the world – filed for Chapter 11 bankruptcy protection in the United States precisely because of such cost overruns.[10]

Cost overruns aside, smaller reactors might be cheaper but they also produce much less electricity and revenue. As a result, generating each unit of electricity will be more expensive.

Design aims to reduce costs

The second part of the SMR abbreviation, "Modular," is again an attempt to control costs. The reactor is to be mostly constructed within a factory with limited assembly of factory-fabricated "modules" at the site of the power plant itself. It may even be possible to completely build a SMR in a factory and ship it to the reactor site.

Modular construction has been increasingly incorporated into all nuclear reactor building, including large reactors. However, since some components of a large reactor are physically voluminous, they have to be assembled on site. Again, modularity is no panacea for cost increases, as Westinghouse found out in recent years.[11]

Safety in scale?

SMR developers say the technology poses a lower risk of accidents, as Canadian Nuclear Laboratories suggests when it asserts "inherent safety" as a property of SMRs. Intuitively, smaller reactors realize safety benefits since a lower power reactor implies less radioactive material in the core, and therefore less energy potentially released in an accident.

The problem is that safety is only one priority for designers. They must also consider about other priorities, including cost reductions. These priorities drive reactor designs in different directions, making it practically impossible to optimize all of them simultaneously.[12]

The main priority preventing safe deployment is economics. Most commercial proposals for SMRs involve cost-cutting measures, such as siting multiple reactors in close proximity. This increases the risk of accidents, or the impact of potential accidents on people nearby.

At Japan's Fukushima Daiichi plant, explosions at one reactor damaged the spent fuel pool in a co-located reactor. Radiation leaks from one unit made it difficult for emergency workers to approach the other units.

Looking ahead

The future for nuclear energy in Canada is not rosy. Canada's National Energy Board's latest Canada's Energy Future 2016 report that projects supply and demand to the year 2040 states: "No new nuclear units are anticipated to be built in any province during the projection period."[13] It notes annual nuclear generation is forecast to decline nearly 12.5% from 98 terawatt-hours in 2014 to 77 in 2040.

Promoters of SMRs argue that investing in small reactors will change this bleak picture. But technical and economic factors, as well as the experience of small nuclear reactors built in an earlier era, all suggest that this is a mislaid hope.

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Toshiba and Westinghouse fight for survival

Author: *Jim Green – Nuclear Monitor editor*

NM849.4673 On August 10, Toshiba reported its financial figures for the 2016 fiscal year (ending 31 March 2017) after repeated delays and a protracted dispute with its auditor. Toshiba reported a net loss of ¥965.7 billion (US$8.83bn; €7.51bn)[1] – more than double the loss of the previous year, and the largest-ever annual loss for a Japanese manufacturer.[2]

Toshiba said its net worth is negative ¥552.9 billion ($5.07bn; €4.29bn)[2] and notes (as it did in April) that there is "substantial doubt about the Company's ability to continue as a going concern".[1]

Toshiba's losses on its nuclear businesses amounted to over US$11 billion (€9.65bn) in the 2016 fiscal year. The company's financial report states: "Toshiba Group recorded a net loss attributable to shareholders of the Company of 965.7 billion yen (US$8622.0 million), due to the loss of 1,242.8 billion yen (US$11,096.3 million) generated in Westinghouse, its U.S. subsidiaries and affiliates, and Toshiba Nuclear Energy Holdings (UK) Limited, a holding company for Westinghouse Group operating companies outside the U.S."[1]

Toshiba noted that its subsidiary Westinghouse Electric Company, Westinghouse's US subsidiaries, and Toshiba Nuclear Energy Holdings (UK) Limited, had all filed for Chapter 11 bankruptcy protection under the US Bankruptcy Code on March 29. Those filings "deconsolidated Westinghouse from Toshiba", Toshiba said.[1]

Toshiba has agreed to meet parent-company contractual agreements with US utilities by paying US$3.68 billion to the owners of the Vogtle AP1000 project in Georgia, and US$2.17 billion to the owners of the VC Summer AP1000 project in South Carolina, in the coming years.[1] Thus Toshiba – assuming the company still exists – will be free from the mess of the AP1000 projects in the US when its makes its final payment in September 2022.

And Toshiba hopes to rid itself of Westinghouse altogether: "As part of the Company's plan to offset the negative impact of the ongoing situation, the Company has been reviewing a restructuring plan of Westinghouse Group including deconsolidation by a potential sale of a majority stake in order to eliminate risk in the overseas nuclear power business."[1]

Auditor dispute

Toshiba had to repeatedly delay releasing its financial figures because of a protracted dispute with its auditor, PricewaterhouseCoopers (PWC) Aarata. The auditor issued an "opinion with qualifications" regarding Toshiba's annual earnings report on August 10, along with an "adverse opinion" on Toshiba's internal controls.[2,3] PWC Aarata also said there is an "unfixed significant misstatement" and that Toshiba's figures "are not based on generally accepted corporate accounting levels".[2]

PWC Aarata believes Toshiba "should have booked a respectable degree or all" of the massive losses

stemming from its US-based subsidiary Westinghouse – lead contractor for the VC Summer and Vogtle AP1000 projects – in fiscal 2015 instead of the following year.[2] Toshiba claims it wasn't aware of the massive cost overruns with the US AP1000 projects but PWC Aarata evidently believes otherwise.[4]

If Toshiba followed its auditor's advice, it would have recorded negative net worth for two consecutive years, which would normally trigger a delisting from the Tokyo Stock Exchange.[5] That, in turn, would take Toshiba one step closer to bankruptcy – hence the company's reluctance to accept the auditor's advice.

Stock exchange listing

As things stand, Toshiba has avoided a stock exchange delisting – but on August 1 it was demoted to the second tier of the exchange, and will no longer feature in the Nikkei 225 index of Japan's top public companies.[6]

Toshiba is still under pressure. *Japan Times* noted that "there are still two scenarios under which it could be delisted from the Tokyo Stock Exchange: by failing to eliminate its negative net worth and failing to show improvement in its internal management controls. TSE rules stipulate that firms must be delisted if they conclude two consecutive business years in a negative net worth. Because Toshiba ended 2016 with a negative net worth, it was demoted last Tuesday to the TSE's second section."[7]

Financial Times journalist Peter Wells wrote on August 10:[8]

"The immediate threat to Toshiba may have receded after its auditor signed off its annual results but the broader dangers that still threaten the company's future have not disappeared. Toshiba remains, say people close to the conglomerate, "absolutely devoted" to remaining listed on the Tokyo Stock Exchange.

"But the decision by PwC Aarata, Toshiba's auditor, to add a so-called adverse opinion of the company's internal controls could still bring about its delisting. "I don't see how the TSE can look at the wording of that criticism and decide that Toshiba did have adequate control of its systems at the end of March 2017," says Travis Lundy, an analyst at Smartkarma. The wording, he suggests, lowers the likelihood of Toshiba remaining listed. "I don't see anything that suggests this was a problem in the past, but that it has now been fixed."

"Toshiba's biggest challenge has certainly not gone away. It is still scrambling to fill a $5bn hole in its shareholder equity, punched by a $6.3bn writedown on its US nuclear business, the Westinghouse subsidiary that filed for Chapter 11 bankruptcy protection this year. Japanese companies that report two consecutive years of negative shareholder equity face delisting from the TSE, although the exchange operator is able to exercise some discretion.

"Successfully closing the $18bn sale of its memory chip business by the end of its financial year in March 2018 remains Toshiba's best shot at reversing the shareholder equity deficit and avoiding a forced delisting. But the sale process continues to face numerous obstacles, and bankers, lawyers and other executives involved with the sale have repeatedly described "chaos" in the process. ... Owing to the time any sale agreement would take to pass regulators – as well as the need to smooth out a complicated legal spat with joint venture partner Western Digital – Toshiba has in effect until the end of August to conclude a sale, say bankers and lawyers involved in the talks."

"Even if Toshiba can get the chip unit sale back on track in a timely fashion, the risk of delisting may not subside quickly. Since its [profit padding] accounting scandal in 2015, Toshiba has been under scrutiny from the TSE, and in September last year submitted a report on its internal management controls to the bourse operator. But that was knocked back by the exchange three months later. In March, Toshiba resubmitted the report – its second and final chance to impress the TSE that its controls were up to scratch. Should the TSE at some point decide that Toshiba's internal controls are passable, then it would have to justify how it arrived at a different conclusion from the independent auditor. Such a discrepancy could send investors at home and abroad the wrong signal at a time when Japan is keen to show it is trying to improve corporate governance standards."

Bankruptcy

The small risk of Toshiba going bankrupt will loom much larger if the sale of the memory chip business falls through. There is also a possibility that Toshiba will voluntarily file for bankruptcy protection, much as Westinghouse has done in the US. The *Wall Street Journal* reported on July 27:[9]

"A number of creditors and others involved in Toshiba Corp.'s restructuring are pushing for a Toshiba bankruptcy filing as the best path to rebirth after its effort to raise money through a chip-unit sale stalled. People involved in talks over Toshiba's workout, including business partners, lawyers and people with ties to the company's main bankers, said bankruptcy is worth serious study. Some of them said it is the best available option and that they are advocating it in discussions with Toshiba or creditors. They said a bankruptcy filing by Toshiba, the core of an industrial conglomerate, could free it of burdens that include lingering liabilities from the March bankruptcy of its Westinghouse Electric Co. nuclear unit in the U.S."

"Toshiba's chief executive, Satoshi Tsunakawa, said at a recent news conference that seeking debt relief through the courts isn't an option. A Toshiba spokesman reiterated this week that the company has "no specific plan" to seek bankruptcy protection.

"A person familiar with deliberations at one of Toshiba's main lenders compared the conglomerate to a hole that might have treasure at the bottom but also lurking snakes. Bankruptcy, this person said, could kill any snakes and let the lenders access the treasure. ...

"One person directly involved in a portion of the Toshiba recovery plan said "everyone thinks" bankruptcy has to be looked at – but it is difficult to say so publicly."

Westinghouse

On July 31, SCE&G and Santee Cooper announced their decision to abandon the two partially-built AP1000 reactors at the VC Summer plant in South Carolina.

Westinghouse wasn't forewarned even though it was formally the lead contractor on the project (though less directly involved since its March 29 bankruptcy filing). Westinghouse has been working on restructuring plans which assumed that the company would play a minor but profitable role in the completion of the VC Summer project – those plans must now be reworked.

In a court filing on July 26, Westinghouse asked a New York bankruptcy judge to allow the company an extra three months to file a restructuring plan.[10] Westinghouse said it needs more time given the complicated nature of the business – the company has thousands of vendors, around 37,000 creditors and "five different business lines that serve more than half of the nuclear power plants in the world".[10] Bankrupt companies have a 120-day exclusivity period to come up with a reorganization plan, the *Pittsburgh Post-Gazette* reported, and another 60 days to try to gain approval of it without worrying about creditors or others introducing competing plans.[10] Westinghouse is seeking to extend both deadlines until December 6 and February 4, 2018, respectively.

On July 31, Westinghouse said it has submitted a five-year business forecast to its bankruptcy lenders which includes savings of US$205 million over that period and plans to cut 7% of its 14,000-strong global workforce.[11,12]

In early August, Westinghouse laid off 870 employees who were working on or supporting the VC Summer project.[13] That prompted a lawsuit alleging that Westinghouse violated labor laws by laying off hundreds of workers without proper notice. Seeking class-action status, Andrew Fleetwood, a field engineering manager at VC Summer, is suing Westinghouse for violating the Worker Adjustment and Retraining Notification Act, which requires employers to provide at least 60 days of advance notice before a plant shutdown or a mass layoff.[13] Westinghouse said it provided as much notice as practicable and that the employees will be permanently laid off on August 31 if no other assignment is identified for them.

On August 7, Westinghouse asked the bankruptcy court to allow it to break thousands of contracts associated with the VC Summer project – contracts cover everything from engineering services and security protection to scaffolding and urine testing.[14] These contractors will join the long list of unsecured creditors in Westinghouse's bankruptcy. The company has accumulated debts of around US$9.8 billion.[15]

Santee Cooper said in late July that it will continue to pursue Westinghouse's assets in bankruptcy court to obtain further payment on top of its share (US$976 million) of the parent-company contractual settlement of US$2.17 billion agreed to by Westinghouse's parent company Toshiba for the VC Summer project.[16] Santee Cooper will "continue to pursue Westinghouse ... revenues and assets through bankruptcy court and other legal channels" to further offset its losses, according to chief executive Lonnie Carter.[17]

On June 27, the Delaware Supreme Court ruled against Westinghouse, and in favor of Chicago Bridge & Iron Co, in a US$2 billion dispute over cost overruns with the four AP1000 reactors under construction in Georgia and South Carolina.[18,19]

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A stay of execution for the South Carolina AP1000 reactor project

Author: *Jim Green – Nuclear Monitor editor*

NM849.4674 The two partially-built AP1000 reactors at the VC Summer plant in South Carolina may be resurrected – but it is a long shot. On August 15, South Carolina Electric & Gas Co. (SCE&G) – 55% owner of the project – announced that it had voluntarily withdrawn its petition to the South Carolina Public Service Commission to abandon the two reactors, a fortnight after saying it would discontinue work on the project and lodging the abandonment petition.[1]

Kevin Marsh, CEO of SCE&G parent company SCANA Corp., said SCANA has "not changed our position on abandonment" and that the withdrawal of the petition is seen as temporary and that it will be refiled "at an appropriate time" once reviews of the project by legislators are complete.[2] That may be after state legislators complete their Jan.– May 2018 sitting session, by which time they will also have completed reviews of the VC Summer project failures.[3]

SCE&G said it might not complete the reactors even if a new power company is willing to partner on the project.[4] The company previously said it would have been willing to proceed with one of the two reactors if not for the decision of state-owned Santee Cooper – 45% owner of the project – to abandon both. But Marsh told state legislators on August 10: "I've got to be convinced that building the one-plant option – even with a new partner – would be in the best interest of our customer."[4] He also said it would take at least a year to restart the project, even if a new partner emerged.

Marsh said the project could only move forward with a willing and capable partner, a new ownership agreement, a suitable agreement with a capable construction firm, some certainty about the project being able to qualify for a federal government tax credit (effectively a subsidy of about US$2 billion), and a new agreement with Westinghouse for design engineering services since "the plant is their design."[5] The new partner would need to stump up US$3 billion.[6]

A federal government handout would also be required to revive the VC Summer project. Marsh noted that before abandoning the project, he went to the Department of Energy seeking a grant, but the agency responded with an offer of a loan. "Loans are nice, but they don't reduce the cost of the project. What we were trying to do was minimize the cost of the project," he said.[3] SCANA sought a non-repayable grant of US$1–3 billion.[7]

Marsh said the federal government would also need to guarantee that ratepayers wouldn't foot the bill for a project with an uncertain price tag. "We would need to protect customers from that risk, and that would be an absolute we would have to have from a cost perspective," he said at an August 1 public hearing with state regulators.[8]

So SCANA wants a US$1–3 billion direct handout, a US$2 billion indirect handout in the form of tax credits, and also a blank check covering future cost overruns! No wonder the Trump administration has been silent on a nuclear project it once called 'massively important'.[8]

Reviving the project would also depend on the Base Load Review Act, which state legislators seem intent on revising or repealing, Marsh said.[9] The Act allowed project partners to charge ratepayers for construction of the reactors during the construction period, and also gives them the right to pursue sunk costs from ratepayers.

State Governor Henry McMaster said that he was looking for a utility to buy Santee Cooper's share of the VC Summer project– or even to buy Santee Cooper outright – if it meant one reactor would be completed. McMaster said his office was reaching out to some of the South's largest power companies – including Dominion Energy in Virginia, Duke Energy in North Carolina and the Southern Co. of Georgia – to see if they were interested in all or part of the state-owned utility.[4] McMaster said he has heard from a "number of entities that have expressed an interest in purchasing Santee Cooper, in whole or in part, or have inquired regarding Santee Cooper's ownership interest" in the plant.[10]

At an August 22 meeting of South Carolina Senate's VC Summer Nuclear Project Review Committee, Santee Cooper representatives said they were aware of "very preliminary" discussions involving the Governor about the possible sale of the utility.[6] Asked what would become of Santee Cooper's almost US$8 billion of debts – US$4 billion for the nuclear plant – Santee Cooper's chair Leighton Lord said: "It would stay with the state of South Carolina. I don't think any investor utility would want to acquire $4 billion in [nuclear] debt."[6]

So reviving the project would require a US$1–3 billion direct handout, an indirect US$2 billion tax-credit handout and a blank check from the federal government, a US$4–8 billion bailout from the state government, maintaining the Base Load Review Act which allows the project partners to continue to gouge ratepayers, a new project partner with US$3 billion to spare ... and much more besides. So much for nuclear power being too cheap to meter.

Estimates of the amount already spent on the VC Summer project range from US$9 billion to US$10.4 billion.[11] The estimated cost to complete the project, from start to finish, is around US$25 billion including interest, according to Santee Cooper's Lonnie Carter (almost US$18 billion excluding interest).[6]

SCANA's Kevin Marsh said: "The governor has stated that he's looking for another partner to possibly come into the plant, but if someone says they're interested,

that's not something that will happen overnight," Marsh said. "There are a lot of bridges that have to be crossed before we would get there."[4] SCANA had looked unsuccessfully for a new partner before giving up on construction on July 31.[12]

Santee Cooper said it had heard from two utilities interested in buying its 45% share of the VC Summer project, after contacting "about 50 utilities and other entities in the Southeast who could enter into power purchase agreements dozens of power companies."[13] But Lonnie Carter, the utility's chief executive, said neither company has the assets to undertake a multi-billion-dollar construction project.[14] Santee Cooper has set a September 15 deadline for serious expressions of interest.[15]

Corso Capital Management analyst David Frank said that abandoning the project was the likely outcome: "I'm not quite sure how anyone after any comprehensive review could come to any other decision – I mean, even if you had someone with half a brain – to spend the amount of money with all of the risks and potential risks that are still ahead. All these people, I'm sure they are very upset, it's very emotional, but I'd be curious to really hear someone make a solid argument for going ahead and taking on all that risk."[3]

Dukes Scott, executive director of the South Carolina Office of Regulatory Staff, said it would take something close to a miracle to revive the project.[6]

Blame game

Just about everyone involved in the VC Summer fiasco failed to meet expectations by a wide margin – state legislators and regulators, the project owners, the lead contractor Westinghouse and a number of other contractors and sub-contractors. Legislators are trying to shift blame to the project owners, who are trying to shift blame to Westinghouse.

The South Carolina House and Senate have initiated separate inquiries, both of which are providing plenty of theatre. Commenting on the failure to establish a credible work schedule or cost estimates before the project began, Republican Rep. Kirkman Finlay told the House inquiry on August 23: "We embarked on a multi-year, multi-billion project with a road map that we didn't really believe was going to get us to the destination. Help me understand how we could have planned it less thoroughly."[16] Republican Sean Bennett, a member of the Senate inquiry, told a community meeting that "the good news is, there is no good news".[17]

Many of the legislators investigating the VC Summer fiasco are themselves partly responsible for it. South Carolina resident Joe Cali said: "This is like asking the foxes to investigate the depredations at the hen-house."[17]

Republican state Senator Shane Massey said at an August 22 hearing into the fiasco: "We went a number of years with Westinghouse just screwing you over and you let it happen. We can sit here and we can blame Westinghouse all day. At some point, y'all, we can't pass the buck anymore."[18]

Santee Cooper chair Leighton Lord blamed state and federal politicians ... and Westinghouse: "Without the state Base Load Review Act, the project would have never started. Without the Congress providing single-application licensing, and production tax credits for new nuclear construction, the project would have never happened. ... [W]e would have completed the new units if Westinghouse had lived up to its contract to complete the project for an agreed fixed price. Westinghouse failed to do what it promised it could do."[19]

Cindi Ross Scoppe, a columnist with *The State* newspaper, highlighted the absurdities of the Base Load Review Act:[20]

"You're a private-sector, regulated utility, so your job is not to protect ratepayers. They're stuck with you, and besides, it's the government's job to look out for them. Your job is to protect your stockholders. And you're doing that. Magnificently. That's why you and your executive team keep getting those huge bonuses.

"There's this law, the Base Load Review Act, that your team convinced the Legislature to pass in 2007. It says your stockholders won't suffer the consequences of your decisions, no matter how much you go over budget. In fact, the more you spend, the more they profit, because they're guaranteed a 10.25 percent return on investment. So you have no incentive to keep costs down. Just the opposite.

"You have no incentive to get out unless things get so bad that it would be "imprudent" – an important legal term that can yank that profit out of your fingers – to continue. Like, say, if your prime contractor goes belly up. And your 45 percent partner bails on you. Until that happens, invest more, profit more.

"When you add this bizarre economic incentive to the natural human inclination toward inertia, it's almost impossible not to keep sending money on the project. More than you should. Longer than you should. That situation is not SCANA's fault, at least not mostly. It's the fault of our Legislature, which created that disincentive to keep costs down. Or pull the plug."

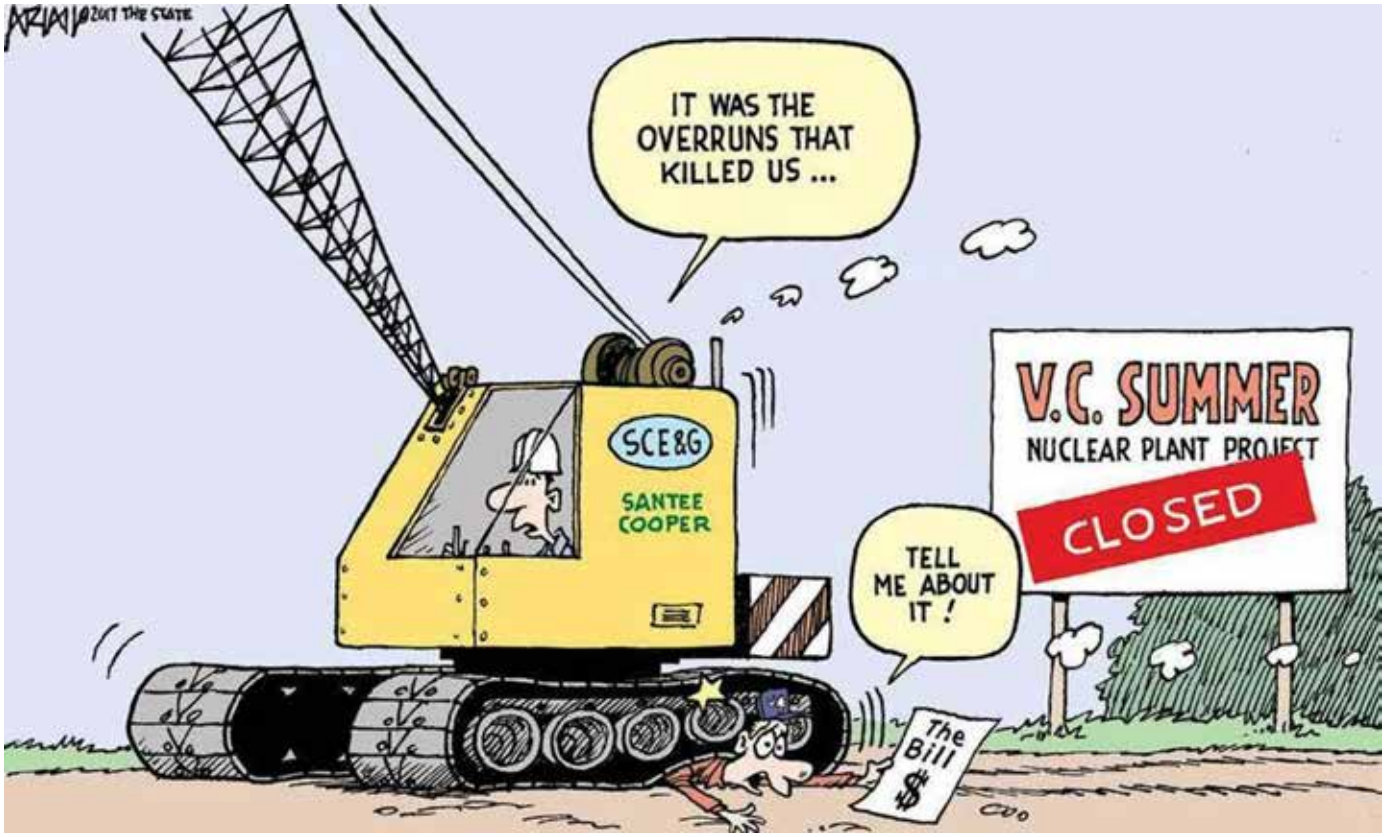
In a blistering attack that's worth reading in full, Republican state Senator Chip Campsen blamed state legislators for passing the Base Load Review Act.[21] He says that as a freshman senator he voted against the Act in 2007 but it was approved by a vote of 21 to 1.

Campsen writes:[21]

"This shifting of risk to customers, when coupled with guaranteed returns up to 11 percent on construction costs, created a perverse incentive to spend big dollars building risky plants. The more utilities spend, the more money they make. Customers underwrite it all, even if a project fails.

"How did such a bill ever pass the General Assembly? The principle of concentrated benefits and diffuse or abstruse costs. When the benefits of a bill are significant and concentrated in a few, beneficiaries lobby the General Assembly assiduously for its passage. When costs are diffuse, abstruse, or both, no one is motivated to lobby against it. Members sense a lot of support and no opposition. The bill typically passes.

"In this case utility lobbyists descended upon the General Assembly like the plague of locusts in Exodus 10. And



what of the opposition? Instead of locusts, it was crickets chirping. Opposition was essentially nonexistent."

Cheryl Rofer, who runs the 'Nuclear Diner' blog, blames everyone in a sarcastic post:[22]

"So congratulations to:

The contractors who cannot build nuclear plants on time and within budget. Special mention for lowballing their bids and failing to meet quality control requirements.

The utilities that cannot contract or manage the building of nuclear plants.

The financiers who have botched their judgments of the projects.

Proponents of nuclear power. The strategy of competitive parading of one's knowledge, parochial defense of a single system against all others, and unthinking opposition to wind and solar have been tremendous public relations successes.

Opponents of nuclear power. Spreading incorrect information and confusion instead of clearly delineating actual problems with nuclear power has made the public dumber.

Reporters who can't be bothered to learn middle-school science.

The schools that didn't teach it.

The Department of Energy and its predecessors. From a major misjudgment by a Rickover protégé through continuing confusion as to its role relative to the national laboratories and wildly varying support for nuclear energy, these agencies at best have been a neutral influence on commercializing nuclear energy.

Congress. Ever-increasing micromanagement of budgets, bending to lobbyists without a clear plan, and, since the mid-1990s, continuing resolutions rather than thought-out budgets make long-range plans impossible.

The national laboratories. Replacing their role as national resources for nuclear issues with a university model of individual investigators, but with more fighting over resources and overhead has diluted what they can contribute to the development of nuclear power.

Particular thanks to those who have assembled studies showing their favorite type of energy to be the most economically favored.

Good job, all! Your participation trophies are in the mail."

Environmentalists and nuclear opponents

The weirdest part of the blame game is the mud being thrown at environmentalists. Environmentalists aren't to blame for the VC Summer fiasco. As *Houston Chronicle* business columnist Chris Tomlinson noted: "Let it be written that environmentalists didn't kill the nuclear power industry, economics did. South Carolina Electric and Gas Co. and partner Santee Cooper abandoned work on two new nuclear reactors ... not because of public protests, but because the only way to pay for them was to overcharge customers or bankrupt both companies."[23]

Nonetheless, attempts are being made to blame environmentalists and nuclear opponents more broadly. James H. Holloway Jr., an accountant whose clients have included nuclear utilities and companies, runs this curious argument:[24]

1. Historically, environmentalists and other nuclear opponents forced costly delays to reactor construction, stopping some and driving up the cost of others.

2. As the nuclear renaissance took hold, power companies had to eliminate the risk of opponents forcing costly delays. Hence the need for the Base Load Review Act and similar legislation elsewhere: "If customers were charged for the interest during construction (and construction delays), then opponent activities to stall or stretch out construction would have less financial impact on the project. ... If the activities of nuclear power opponents had not had such a large effect on earlier construction, there would have been no need for a base load law for the new construction."
3. "So when you're sending out thank you notes to the Public Service Commission, SCANA and the Legislature for their roles in forcing you to pay the construction interest on these now-abandoned nuclear plants, be sure to include one to your favorite nuclear power opponents. They won't like it, but they do need to hear from you."

But of course, as Santee Cooper's Leighton Lord bluntly stated, without the state Base Load Review Act, the project would never have started.[19]

And of course, Westinghouse, SCE&G, Santee Cooper and others proved themselves perfectly capable of screwing up the VC Summer project without any help from environmentalists and other nuclear opponents.

Had the early warnings of environmentalists been heeded, the project never would have started. South Carolinians would have saved many billions of dollars. Or some or all of the wasted money could have been invested in renewables which would have been producing low-carbon power years ago.

Had the mid-project warnings of environmentalists been heeded, problems with the project might have been forced onto the public and political agenda and the project might have been put back on track – or abandoned at a much earlier date with the associated savings.

Sammy Fretwell wrote in *The State* newspaper on August 12:[25]

"The troubles at the site didn't surprise [Columbia lawyer Bob] Guild and a small group of environmentalists who oppose nuclear power. Even though they philosophically do not believe in building more nuclear plants, activists from the Sierra Club and Friends of the Earth raised questions as far back as 2008 about the cost of the project and how it might affect ratepayers. Through the years, they held signs and acted out satirical plays, in an effort to raise awareness.

"Despite the efforts, Guild and others said they were able to gain little more than moderate support. "There were so many issues, but people didn't pay attention'' said Leslie Minerd, a longtime environmental activist and Five Points business owner. "Legislators bought what SCE&G said hook, line and sinker. They were listening to them before us.""

The fake environment group 'Environmental Progress' claims that SCE&G and Santee Cooper were "caving into pressure from Sierra Club and Friends of the Earth" by abandoning the project.[26] Attempting to justify that ridiculous claim, 'Environmental Progress' said: "The effect of the campaigns funded by [Friends of the Earth and the Sierra Club] has, in fact, been to create the environment in which the Summer project is abandoned".[27]

Friends of the Earth complained in an August 22 statement about the failure of the South Carolina legislature to include public interest groups in their inquiries into the VC Summer project.[28]

Friends of the Earth has nevertheless filed unsolicited testimony – titled 'Doomed from the Start' – with the legislature.[29] The testimony "documents the state's Public Service Commission (PSC) and the Office of Regulatory Staff (ORS) repeatedly failed to thoroughly analyze suspect requests by utility South Carolina Electric & Gas (SCE&G) concerning cost overruns, schedule delays, construction problems and nine pay-in-advance rate hikes to pay for project financing. Public interest groups, namely Friends of the Earth and the Sierra Club, repeatedly raised warning flags about challenges facing the project but were ignored by both the PSC and ORS."[28]

Tom Clements, senior adviser with Friends of the Earth and author of the 'Doomed from the Start' testimony, said: "As has been clear since day one, both the PSC and ORS viewed their roles as facilitators in what SCE&G requested, an approach that makes the regulators in large part responsible for the resulting debacle. Both the PSC and ORS rubber stamped every cost overrun and schedule delay that SCE&G asked for and it is now clear that those decisions were based on faulty information and grossly inadequate analyses. For their failure to protect the public interest, PSC commissioners and the director of the ORS must accept responsibility for enabling this $9 billion debacle and resign."[28]

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The Nuclear Information & Resource Service (NIRS) was set up in the same year and is based in Washington D.C., US.

WISE and NIRS joined forces in the year 2000, creating a worldwide network of information and resource centers for citizens and environmental organizations concerned about nuclear power, radioactive waste, proliferation, uranium, and sustainable energy issues.

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