SMR – The Second Make-Believe Renaissance

SMR stands for "Small Modular Reactor(s)". It also stands for the Second Make-Believe Renaissance, for it is the latest effort by an increasingly desperate nuclear industry to create a "Nuclear Renaissance". They have already failed once before.

Nuclear Renaissance Number 1

In the west, the expansion of the nuclear industry pretty well came to a halt in the late 1970's and 1980's. This was provoked in large part by economic difficulties and industry screwups including TMI and Chernobyl. So, around 2001, the industry decided to announce a "Nuclear Renaissance" based on "advanced" nuclear reactors (Generation III) that would be faster and cheaper to build, safer to operate and better able to cope with emergencies including meltdowns, and so forth.

At the time, I jokingly remarked that the industry is looking for a Renaissance because they know that they are still stuck in the Dark Ages. That quip may have been prophetic.

The planned nuclear renaissance was a huge flop: more hype than substance. The World Nuclear Association reported that nuclear electricity generation in 2012 had sunk to its lowest level since 1999. In 1999 nuclear electricity accounted for more than 17 percent of global electricity production and today (2018) it is less than 11 percent. It is important to realize as well that electricity is only a slice of the global energy "pie", so that even 17 percent of electricity use is just 3 percent of global energy use. Eleven percent of global electricity is less than 2 percent of worldwide energy use, and that percentage is shrinking.

The originally planned renaissance depended on plants that were larger-than-ever and safer-than-ever. The French company Areva proudly announced the EPR reactor. *"The first two EPR projects, in Olkiluoto, Finland, and Flammanville, France, were meant to lead a nuclear renaissance but both projects ran into costly construction delays"* . They went so many billions of euros over budget that Areva was virtually bankrupted, but was bailed out by the French government. *"Construction commenced on two Chinese EPR units in 2009 and 2010. The Chinese units were to start operation in 2014 and 2015, but the Chinese government halted construction because of safety concerns."*

"March 2017 saw a setback for nuclear renaissance when the producer of the AP1000 reactor — Westinghouse Electric Company — filed for Chapter 11 bankruptcy protection. Four months later the bankruptcy — together with delays and cost overruns — caused cancellation of the two AP1000 reactors under construction at the Virgil C. Summer Nuclear Generating Station."

These quotes are from Wikipedia: https://en.wikipedia.org/wiki/Nuclear_renaissance

The Canadian "Advanced CANDU Reactor" (ACR) never saw the light of day either, and led to the sale of the AECL CANDU division to SNL-Lavalin for a paltry $15 million in 2011. ACR was supposed to be another cornerstone of the Nuclear Renaissance, originally planned for either 1000 MW or 700 MW. It did not make it out of the womb.

The promise of a nuclear renaissance fuelled wild speculation in the uranium market. This led to a spectacular spike in uranium spot prices, which shot up from less than $20 per pound (from 1984 to 2004) to $135 per pound ($300/kg) in 2007, declining to about $100 per pound by 2010. Driven by these artificially high prices an army of uranium exploration companies rushed to stake claims where none had ever been staked before,

By 2011, with the Fukushima triple meltdown and the subsequent closure of all of Japan's 54 nuclear reactors, the uranium bubble burst and spot prices started sliding, reaching the $20 per pound range by 2012. Uranium exploration ceased as the market slumped. In 2018 Cameco, the Canadian uranium mining giant, shut down some of its most productive mines in Saskatchewan and the US, and laid off thousands of workers.

Nuclear Renaissance Number 2

So now the nuclear industry, imagining itself rising from the ashes of its own calamitous failure, is launching a NEW nuclear renaissance based on "Small Modular Reactors" (SMRs). There is no precise definition of an SMR except that it should be no more than 300 MW in power output, and could be as little as 10 MW or less.

***"Small modular reactors** (**SMRs**) are a type of nuclear fission reactor which are smaller than conventional reactors, and manufactured at a plant and brought to a site to be fully constructed. Modular reactors allow for less on-site construction, increased containment efficiency, and heightened nuclear materials security. SMRs have been proposed as a less expensive alternative to conventional nuclear reactors."*
https://en.wikipedia.org/wiki/Small_modular_reactor

There is a bewildering variety of SMR designs, using uranium, plutonium, or thorium in the fuel, using molten salt, liquid metal, or ordinary water as coolant, but all intended to run for a long time with a replaceable core – and all to be built at a centralized factory.

The Catch-22 in all of this is that Small Reactors are NOT cheaper than large reactors, quite the contrary! Because of the safety features that must be included in order to be licensed, needed to contain the enormous inventory of intensely radioactive fission products and extremely radiotoxic actinides and prevent them from escaping, these SMR's can only begin to break even if they are purchased in the hundreds or thousands of units. The economies of scale only kick in when they are mass-produced. So mass-marketing is absolutely essential. Don't be surprised if your community is targeted!

Already the Canadian government (which has, at least tentatively, bought into this SMR scheme through its adherence to "NICE: Nuclear Innovation = Clean Energy") is scouring the country for possibilities. In Alberta dozens of SMRs might be employed to "cook" the oil sands in order to extract the bitumen. In the northern regions SMRs might be used to replace diesel generators, especially in arctic and subarctic conditions. In New Brunswick SMRs could be sold to appease those who have over the years clamoured for a second Point Lepreau (a refurbished 600 megawatt CANDU reactor).

But it is pretty certain that none of these plans could be realized without very hefty government subsidies. The banks won't touch them. SMRs will be initially sold at a loss just to “prime the pump” in hopes that a profitable market will eventually materialize. And the SMRs themselves are purely conjectural at this point, none have them have been built or licensed or tested or operated. It will take at least a decade or two to get them up and running, if ever that happens. Meanwhile the economic prospects for nuclear, especially in the west, are dismal, as the senior vice-president of Exelon said recently.

www.platts.com/latest-news/electric-power/washington/no-new-nuclear-units-will-be-built-in-us-due-26938511

“Due to their high cost relative to other generating options, no new nuclear power units will be built in the US”, an Exelon official said Thursday.

"The fact is -- and I don't want my message to be misconstrued in this part -- I don't think we're building any more nuclear plants in the United States. I don't think it's ever going to happen," William Von Hoene, senior vice president and chief strategy officer at Exelon, told the US Energy Association's annual meeting in Washington. With 23 operational reactors, Exelon is the US' largest nuclear operator.

"I'm not arguing for the construction of new nuclear plants," Von Hoene said. "They are too expensive to construct, relative to the world in which we now live.”

Von Hoene's stance includes so-called small modular reactors, or SMRs, and advanced designs, he said. [Note: “advanced designs” is industry code for plutonium-based]

"Right now, the costs on the SMRs, in part because of the size and in part because of the security that's associated with any nuclear plant, are prohibitive," Von Hoene said.

"It's possible that that would evolve over time, and we're involved in looking at that technology," Von Hoene said. "Right now they're prohibitively expensive."

Gordon Edwards.

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Afterword.

There is a Moltex-designed “small modular reactor” planned for New Brunswick. The NB government has invested $10 million already. See the article linked below:

“Moltex molten salt reactor being built in New Brunswick, Canada”

https://www.nextbigfuture.com/2018/07/moltex-molten-salt-reactor-being-built-in-new-brunswick-canada.html

The linked article about the Moltex reactor in New Brunswick (above) is fundamentally deceptive in several respects:

(1) it does not disclose the need for plutonium as the most important fissile component of the fuel;

(2) it does not disclose that the full panoply of chemically inert fission gasses are to be released after a planned "hold-up" mechanism that is subject to possible failure;

(3) it does not disclose that fission products such as iodine-129 and technetium-99 with half-lives far in excess of 100 thousand years will be produced and remain in the irradiated fuel;

(4) it does not disclose that the Moltex reactor's initial load requires reprocessing of irradiated nuclear fuel to extract the plutonium needed for Moltex fuel, thereby creating large volumes of acidic heat-generating highly-radioactive liquid wastes as a left-over;

(5) it does not disclose that the irradiated Moltex fuel, like all irradiated nuclear fuel, will have to be kept out of the environment of living things for hundreds of thousands of years, and proposes no plan for this;

(6) it does not disclose that a terrorist attack or an act of warfare or sabotage can disperse highly radioactive irradiated fuel over a very wide area;

(7) it makes no mention of the extreme security measures including suspension of civil liberties that might be needed in the event of theft or highjacking of the fuel before it is irradiated, due to the plutonium content.

Below is an excerpt from the Wikipedia article about the Moltex design.

Notice that the fuel is 1/3 plutonium, thus raising grave security concerns as plutonium is an immediately nuclear-weapons-usable explosive material, unlike the fuel in any of today's generation of civilian nuclear power reactors in North America.

[See https://en.wikipedia.org/wiki/Stable_salt_reactor]

"Fuel & materials [for the Moltex Reactor Design]

"The fuel is made up of two-thirds sodium chloride (table salt) and one-third plutonium and mixed lanthanide/actinide trichlorides. Fuel for the initial six reactors is expected to come from stocks of pure plutonium dioxide from PUREX reprocessed conventional spent nuclear fuel, mixed with pure depleted uranium trichloride. Further fuel can come from reprocessed nuclear waste from today's fleet of reactors."

By Gordon Edwards, CCNR, September 12 2018.
www.ccnr.org/SMR_Second_Make-Believe_Renaissance_2018.pdf