



## Supporters of Nuclear Energy

# Newsletter

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### AN INTERNATIONAL VIEW

From time to time these newsletters include personal international or UK views of the construction programme for nuclear plants. This month we have a report from the USA by Dan Yurman, reproduced with permission.

#### **“An international view of nuclear energy issues for 2018**

<https://neutronbytes.com/2017/11/26/looking-ahead-to-2018-for-nuclear-energy/>

This look into the future provides some checkmarks on the page of news about nuclear energy to return to from time-to-time to see what’s going on. Readers also know that this blog presents a “realist” perspective and, while pro-nuclear in perspective, it also faces facts as they are and not as some may want them to be. This list of issues is not exclusive nor does it represent a set of predictions. Here without further fudging is the 2018 list.

#### **China**

China is outpacing all other countries except Russia in the development of advanced nuclear reactor technologies. The U.S. has lost its place as global leader in this field. CGN’s Hualong One has entered the detailed review phase of the Generic Design Assessment (GDA) in the UK. In return for a 33% equity stake in the Hinkley Point C twin EPRs, the Chinese state owned firm gets a shot at building two of its reactors at the Bradwell site. It is a major coup for China’s nuclear export effort which is part of its grand “Belt & Road” effort.

Nonproliferation experts are watching with interest the maturing of a deal between China and France to build a \$15 billion **spent fuel reprocessing** center that can turn 800 tonnes per year of it into MOX fuel. A U.S. effort to build a MOX plant using similar technology is over budget with schedule delays and perpetually behind the political eight ball with the Department of Energy which has repeatedly tried to kill it. Congress continues to fund it, but the level of funding guarantees more schedule and related cost days. Politicians never seem to learn that stretching out the funding results in higher costs.

In North America (U.S. and Canada) there are several dozen entrepreneurial

start ups by developers of **advanced nuclear reactors**, but the earliest any of them would be ready for market will be the late 2020s or early 2030s. So far the only advanced reactor effort that has deep pockets, and a published schedule for commercialization, is TerraPower which also has partners in China to build the first of a kind unit there by the mid-2020s. Washington, DC, think tank Third Way keeps an eye on the advanced reactor development community and advocates for policy and funding support for the emerging industry. It's updated website provides a list of projects and information about the technologies involved in them. On the other hand NuScale has submitted its 50 MW LWR SMR design to the NRC for a safety evaluation and is on track, according to the firm, to break ground for UAMPS in Idaho in 2023. Also, in the LWR SMR world, Holtec opened a manufacturing center in New Jersey intended to support export of its 160 MW SMR to Europe and other regions.

## **Canada**

In Canada the Chalk River nuclear R&D center is setting itself up to be a center of expertise for technology and commercialization of SMRs of all types. It hired experts from the U.S. to drive the process and developers responded enthusiastically to a request for information posted earlier this year.

## **The United Kingdom**

The UK facing the end of life of the North Sea oil & gas fields will build 15 or more full size, e.g., 1000 MW, nuclear reactors over the next decade to keep the lights on. As noted above two of them will be from China. The UK will also proceed aggressively to build smaller versions, called small modular reactors (SMRs), in sizes ranging from 50-300 MW of conventional light water reactors. Rolls Royce, which has built small reactors for the Royal Navy, is pushing the government to put its money on the table to support the new industry.

## **India**

India will continue to keep western vendors at arms length preferring to build a ten units of a domestic reactor design (700 MW PHWR) using Indian companies to supply the components. This may be the year that Areva either gets NPCIL to commit fully to the Jaitapur project or call it quits. The Indian state owned nuclear firm has objected to the cost of the 1600 MW units, and with six of them planned at the site, fears they will gobble up funds that could be used for the smaller PHWRs elsewhere in the country. Also, NPCIL points to schedule delays and cost overruns at Areva's EPR projects in Finland and France as caution flags.

## **Japan**

Japan will struggle to restart its nuclear reactor fleet due to the Fukushima disaster and deep skepticism about safety issues by provincial officials who have virtual veto power over the restarts. It will continue to import LNG and coal to make up the difference. The Nuclear Regulatory Agency has told Japan's utilities it is in no hurry to certify shuttered reactors as being safe for restarts.

## **South Korea**

Despite a brief show of political spin, South Korea finds it doesn't have a choice about keeping its nuclear reactors going. A hand-picked panel voted against the South Korean president's plan to shut down two reactors now under construction. Work will continue on them. U.S. activist Michael Shellenberger, MD, helped South Korean pro-nuclear groups make the case for setting aside the shutdown plan. Former US DOE Sec Steven Chu has warned South Korea about closing operating nuclear reactors and canceling new units. It won't be able to make up the difference in power with imported coal and natural gas.

## **Germany**

Chu also pointed out that Germany has implemented a similar "green" energy policy to do away with nuclear power, but has ended up hurting public health by still depending on coal-fired power plants. In fact, Germany has expanded its lignite coal fields which leads to more CO<sub>2</sub> being spewed into the atmosphere. The policy also burdened ordinary Germans with higher electricity bills while benefiting only industry.

## **France**

Similarly, France is not going to scale back on its use of nuclear energy. Every time government makes a statement about closing half of its nuclear plants it gets a wake up call that 75% of the nation's electricity comes from them. The result is that the government then kicks the can down the road, but does nothing to plan for replacement of units once they hit the 60 year mark. All of the nation's first generation 900 MW units hit that milestone by the early 2040s. To replace them construction must start a decade earlier.

## **Turkey**

Turkey will likely finally break ground in 2018 on Rosatom's build of the first of four of its advanced 1200 MW VVER nuclear reactors at Akkuyu on its Mediterranean coast. Less certain are schedules for projects at Sinop (Mitsubishi/Areva to build 4 1100 MW Atmea PWRs) on the Black Sea coast or Igneada near the Bulgarian border. For Sinop construction was supposed

to start this year with completion in 2023. No update is available on a revised schedule. Negotiations are ongoing for a nuclear project at Igneada in Kirklareli province on the Black Sea. No specific site has been selected. WNA reports that in November 2014 EUAS signed an agreement with the State Nuclear Power Technology Corporation (SNPTC) of China and Westinghouse to begin exclusive negotiations to develop and construct a four-unit nuclear power plant. Designs will be either the AP1000 or the new CAP 1400 both PWR type units.

### **The Czech Republic**

The Czech Republic may finally, after several false starts, get a tender out the door for new reactors at Temelin and Dukovany. Rosatom would like to get its arms wrapped around these deals, but so would Areva and Westinghouse. Germany, which is struggling with the self-imposed pain of high electricity prices after closing half its nuclear fleet, would love to buy cheap nuclear power from CEZ, the Czech state-owned power utility.

### **Romania**

Romania, which has two 600 MW CANDU 6 PHWR reactors at Cernavoda, is building two more there. China Nuclear Power Engineering Co. (CNPEC), a subsidiary of China General Nuclear Power Group, (CGN) is partnered with Candu Energy, the former reactor division of AECL that was sold off to a private sector engineering firm. China has agreed to provide €6.5 billion in financing for the project.

### **Hungary**

Hungary will build two Russian VVERs at the PAKs site after clearing a case of political correctness with the European Union which seems to want to turn the continent into the energy equivalent of a children's petty zoo. The Russians see the deal as pulling its former Cold War satellite back into its economic sphere of influence.

### **The United Arab Emirates**

The United Arab Emirates has four South Korean 1400 MW PWR type units under construction at a site on the Persian Gulf at a cost of \$20 billion. The first unit is expected to be complete in 2018. The project is a showcase for South Korean expertise in meeting schedule and cost commitments and for the UAE in developing peaceful uses of atomic energy in a politically volatile region.

## **Saudia Arabia**

Saudi Arabia continues to slowly develop a nuclear energy program with a RFI type tender for two 1400 MW PWR type reactors. South Korea, which is already developing a 300 MW SMR for KSA, is expected to bid as will Rosatom. The Russians managed to get wire services on a tizzy over its claim that the tender was for a now cancelled plan for 16 reactors. Westinghouse is also reported to want to bid, but the lack of a 1-2-3 Agreement between the U.S. and KSA is going to be a problem.

## **South Africa**

South Africa continues to engage in a frenzied debate over a plan to build 9.6GWe of nuclear power (8 1200 MW units). In 2014 South African President Zuma accepted a proposal from Rosatom for 50% financing of the project which ran into a buzz saw of political opposition over the back door procurement process and also where the South African portion of the financing would come from. President Zuma has cycled through three finance minister all of whom told him the government can't afford the project and a fourth is now at loggerheads with Zuma's energy minister on the same issues. More troubles for South Africa's plan to build the reactors came in late November 2017 as S&P cut the country's debt rating and Moody's issued a warning to investors. The Bloomberg wire service reported that S&P Global Ratings cut South Africa's local-currency debt score to junk, while Moody's Investors Service also threatened to slash its ranking to the same level, raising the risk of a sell off.

## **Vietnam**

In 2017 Vietnam cancelled its plans for eight nuclear reactors from Russia and Japan for two reasons. The first is that it can't afford them. The second is that despite nearly a decade of work it still didn't have the institutional capacity nor expertise to regulate them.

## **Argentina**

In South America Argentina started construction in 2014 of a 25 MW SMR. The first fuel load was scheduled for late 2017, but an exact date has not been confirmed. Argentina has plans to start work on a 750 MW Candu 6 type unit in partnership with China National Nuclear Corp (CNNC) which also has an agreement to build a 1150 MW Hualong One there. The Candu 6 unit is supposed to break ground in 2018 and the Hualong One in 2020. Both dates are subject to change. Separately, Rosatom has an agreement in principle to build a 1200 MW VVER for Argentina, but no site nor construction schedule has been announced for the project.

## **Brazil**

In Brazil Angra 3, a 1400 MW PWR which has been under construction in fits and starts since 2010, is now scheduled to be complete in 2018. Plans to build another four-to-six 1000 MW units at various site remain on the budget wish list due to a lack of funding.

## **Mexico**

Mexico would like to build two more nuclear reactors at Laguna Verde. However, that project would require a supply chain that includes firms in the U.S. Mexico's 1-2-3 Agreement with the U.S., nearly completed in July 2016 under President Obama, remains in limbo more than a year later under President Trump.

## **Finland**

In Finland the agonizing saga of construction of Olkiluoto 3, an Areva 1600 MW EPR, is finally coming to an end with start up testing now scheduled for 2018. Construction of a fifth reactor for Finland at Fennovoima, the Hanhikivi 1, a 1200 MW VVER from Rosatom, has encountered schedule delays, but is expected to proceed.

## **USA**

In the U.S. the cancellation of the twin Westinghouse AP1000s for the V C Summer project in South Carolina has sent shock waves through the industry. Meanwhile, two similar units being built at the Vogtle site in Georgia are moving ahead with delayed start dates now in the 2020s. Westinghouse declared bankruptcy, and while its new CEO has plans to emerge from that status in 2018, the complexities of the case leave some analyst skeptical of the company achieving that milestone. Toshiba, the parent firm, has announced plans to sell the firm, and soon, to pay off its creditors which include cash settlements to the utilities building the AP1000s at Vogtle and V C Summer. Both utilities have factored their settlements to get cash ahead of the sale.

The U.S. continues to **close nuclear reactors** due to the low cost of natural gas. Efforts to subsidize their operation to give them credit for CO<sub>2</sub>-free electricity generation have met with mixed results in New York and Illinois. Efforts to save two reactors in Ohio so far have fallen short with strong opposition from rate payer groups. In New York Entergy gave up the effort to get 20 year license extensions for the twin reactors at Indian Point. Well-funded green groups convinced New York Governor Cuomo to press for closure. Entergy had previously closed the Vermont Yankee reactor soon after getting a 20 year

renewal due to low natural gas prices and an untenable political situation in Vermont. Entergy has also announced plans to close the Pilgrim reactor in Massachusetts in 2019. It refueled the plant for the last time this year. However, in September Entergy reversed plans to close the Palisades plant in Michigan, keeping it open at least until 2022. Separately, Dominion filed for another 20-year license extension, to 80 years, of its twin reactors at North Anna.”

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Aylesbury, Buckinghamshire HP18 9PB Tel: 01844 237602  
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