WISE | NIRS Nuclear Monitor 1978 - 2018

NUCLEAR MONITOR

July 13, 2018 | Issue #864

A PUBLICATION OF WORLD INFORMATION SERVICE ON ENERGY (WISE) AND THE NUCLEAR INFORMATION & RESOURCE SERVICE (NIRS)

WISE / NIRS Nuclear Monitor

The World Information Service on Energy (WISE) was founded in 1978 and is based in the Netherlands. The Nuclear Information & Resource Service (NIRS) was founded in the same year and is based in the U.S. WISE and NIRS joined forces in the year 2000 to produce Nuclear Monitor.

Nuclear Monitor is published in English, 20 times a year, in electronic (PDF) format only. Back issues are published on the WISE website two months after being sent to subscribers (www.wiseinternational.org/nuclear-monitor).

SUBSCRIPTIONS (20 x PDF)

NGOs / individuals 60 Euros

Institutions / Industry 225 Euros

US and Canada: Contact NIRS for details (nirs@nirs.org)

All other countries:
Subscribe via the WISE website www.wiseinternational.org

ISSN: 2542-5439

CONTACTS

WISE

info@wiseinternational.org
www.wiseinternational.org

NIRS

nirs@nirs.org
www.nirs.org

Nuclear Monitor

monitor@wiseinternational.org
www.wiseinternational.org/nuclear-monitor

Monitored this issue:

French Parliamentary Commission issues critical report on nuclear industry 2

A French parliamentary commission has published a critical report about safety and security risks at nuclear plants, inadequate regulation, problems with reprocessing and waste management plans, and inadequate planning and funding for the decommissioning of the country's fleet of aging reactors.

South Korea scraps plans for four power reactors 3

South Korea has taken steps in line with the government's nuclear phase-out policy – an aging reactor will be closed and plans for four new reactors have been cancelled (in addition to the earlier cancellation of two reactors).

A double first for China as Taishan EPR and Sanmen AP1000 connect to the grid 5

The World Nuclear Industry Status Report discusses the startup of an EPR and an AP1000 reactor in China – the first startups of these reactor types anywhere in the world. "The startup of these reactors marks an important milestone in the Chinese nuclear program, but they also highlight the overall failure of the nuclear industry's claims and ambitions for the EPR and AP1000 global expansion."

Germany: Renewables hit record high in first half of 2018 7

Renewable energy sources provided a record 41.5% of Germany's power supply in the first half of 2018.

Nuclear Energy in South Africa: Ramaphosa's mixed messages 8

Ellen Davies and Saliem Fakir from World Wide Fund for Nature summarize two new WWF reports. The purpose of the studies is two-fold: to understand what can be learned from the push for nuclear energy under the former Zuma administration; and to highlight the potential points of intervention available to those seeking to oppose nuclear energy deployment.

Nuclear News: 10

– Belgium: Engie Electrabel fears more decaying concrete in power plants
– Whatever happened to the nuclear renaissance?
– International Energy Agency conference ponders nuclear power's bleak future
– USA: The vanishing nuclear industry
– USA: nuclear power / weapons connections surface again
– Taiwan unable to find US company willing to take radioactive waste
– India: Court rejects plea to shut down Kudankulam plant

French Parliamentary Commission issues critical report on nuclear industry

Author: Jim Green – Nuclear Monitor editor

NM864.4739

A French parliamentary commission, set up in January 2018 to look at the safety and security of nuclear installations, says in a report published on July 5 that nuclear plants remain vulnerable to accident and attack.[1]

"French nuclear installations seem to suffer from an original flaw that will be difficult to remedy: they were not designed to withstand terrorist-like aggression," the commission says. Its report identifies several risks including plane crashes, drone incursions, internal sabotage, external intrusions and cyber attacks.

EDF said in a statement that it is committed to "a process of continuous improvement".[2] However the evidence suggests that EDF has been slow to act. The parliamentary commission was established in part in response to a series of Greenpeace actions highlighting inadequate security at nuclear plants. According to the commission, Greenpeace has conducted 14 intrusion attempts in order to demonstrate the vulnerability of French nuclear sites over the past 30 years. And on July 3, Greenpeace once again demonstrated inadequate security by flying drones into the Bugey nuclear power plant and crashing one of them into the spent fuel building.[3,4]

To reduce security risks, the commission recommends:

- Putting more police on the ground at nuclear sites.
- Reducing the predictability of transporting radioactive material by adjusting departure dates and times, and itineraries where possible.
- Creating a parliamentary delegation for civilian nuclear power whose members (four deputies and four senators) would have *de jure* access to classified information on security and safety matters.

Safety

The commission says the number of safety incidents in France "has risen steadily", citing as examples last year's temporary shutdown of the four reactors at a plant in Tricastin, and an explosion in the non-nuclear section of the Flamanville power plant. The commission also discusses the long-running quality-control scandal at AREVA's Creusot Forge plant involving manufacturing flaws and falsification of documentation.

The commission highlights the risks associated with outsourcing in the nuclear industry, noting that 80% of tasks, both for operation and maintenance, are outsourced to contractors. This leads to a loss of competence within EDF. The report blames the fall of a 450-tonne steam generator during maintenance at the Paluel 2 reactor on problems with cooperation between EDF and its subcontractors (the reactor has been offline since the May 2015 incident). One of the commission's recommendations is to reduce reliance on subcontractors.

EDF's pipe-welding fiasco at its partially-built Flamanville EPR reactor, first revealed in February 2018, also illustrates the subcontracting problem. An estimated 35% of the pipe welds that connect the steam generator to the turbine have defects. The commission notes that this problem has significant consequences in terms of cost, schedule and safety.

The commission criticizes the industry's "ruling out rupture" concept – the assumption that malfunctioning can be ruled out for some key nuclear components. "There are no emergency procedures for certain types of accidents because they are assumed to be impossible," it says.

The commission recommends accelerating the implementation of evacuation plans to replace current plans, which are limited to the closest residents.

Waste

The commission says France's Cigeo deep geologic repository project in Bure, northeastern France, has "certain vulnerabilities" including the risk of an underground fire that cannot be contained. It recommends continuing to study the option of long-term subsurface storage as a possible alternative to geological disposal.

The commission questions, on safety grounds, the heavy reliance on pool storage of spent nuclear fuel (including EDF's proposed centralized pool project). It recommends that dry storage should to be considered whenever possible, and that as much spent fuel as possible should be transferred from pool storage to dry storage.

The commission raises a series of concerns about spent fuel reprocessing and says that relevant parties should consider whether or not to continue reprocessing.

Regulation

The commission recommends strengthening the powers of the French nuclear regulator, the ASN, and giving it (like most of its foreign counterparts) powers of injunction and sanctions.

The commission also recommends that ASN should be asked to apply its legal powers and to impose pecuniary sanctions and financial constraints when its decisions are not respected by nuclear operators.

And the commission recommends that ASN publish the schedule for monitoring prescriptions as well as the amount of fines and financial penalties.

Decommissioning

The commission raises familiar problems about unrealistically low estimates of the cost of decommissioning France's aging fleet of reactors, and inadequate provisions for decommissioning. It recommends establishing a national commission responsible for the control and supervision of decommissioning expenses, expenses related to waste management, and expenses arising from accidents. The commission also recommends that nuclear operators should be required to ensure that provisions for decommissioning are sufficiently liquid.

Precautionary measures after the latest Greenpeace incursion into a nuclear plant. 'Do not leave the gate open. Thank-you.' Source: Charlie Hebdo.

References:

1. National Assembly, 28 June 2018, Report of the Commission of Inquiry on the Safety and Security of Nuclear Facilities, www.assemblee-nationale.fr/15/rap-enq/r1122-tI.asp
2. NucNet, 6 July 2018, 'Commission Calls For Safety Improvements At France's Nuclear Power Stations', www.nucnet.org/all-the-news/2018/07/06/commission-calls-for-safety-improvements-at-france-s-nuclear-power-stations
3. Geert De Clercq, 3 July 2018, 'Greenpeace crashes Superman-shaped drone into French nuclear plant', https://af.reuters.com/article/africaTech/idAFL8N1TZ2CT
4. https://media.greenpeace.fr/299/

South Korea scraps plans for four power reactors

Author: Jim Green – Nuclear Monitor editor

NM864.4740

South Korea has taken steps in line with the government's nuclear phase-out policy – an aging reactor (Wolsong 1) will be closed and plans for four new reactors have been cancelled.[1]

President Moon Jae-in was one of seven candidates in the May 2017 presidential election who signed an agreement to phase out nuclear energy. In June 2017, at a ceremony to mark the permanent shutdown of the Kori 1 reactor, the President said plans for new power reactors will be cancelled and the operating periods of existing reactors will not be extended beyond their design life.[2]

Late last year, approval was granted to complete two partially-built reactors – Shin Kori 5 and 6 – but there won't be any construction starts while Moon Jae-in is in power.

South Korea has 24 power reactors (including Wolsong 1) and the government plans to reduce the number to 18 in 2031 and 14 in 2038[1,3], with a complete phase-out over subsequent decades.

Korea Hydro & Nuclear Power (KHNP) – a subsidiary of the Korea Electric Power Corporation (KEPCO), the majority government-owned utility responsible for 93% of electricity generation in South Korea – announced on June 15 that it will close Wolsong 1, its oldest reactor, before its 2022 licence expiry. Wolsong 1 is a 657-MW CANDU pressurised heavy water reactor which commenced operation in 1983. Its 30-year operational licence expired in 2012 but was extended for another 10 years to 2022.

KHNP cited "uncertain economic viability" and low operating performance as reasons for the early closure of Wolsong 1. KHNP CEO Chung Jae-hoon said: "According to the government's energy policy shift, we have reviewed the operational plans of the Wolsong reactors several times and concluded [that] keeping Wolsong unit 1 operating under strengthened safety regulations would not be economical."[1]

Four planned reactors cancelled

KHNP on June 15 also announced the cancellation of plans for four new reactors. Chung Jae-hoon said "the plans for building new reactors of Cheonji-1,2 and Daejin-1,2 would be terminated in order to eradicate uncertainties in the KHNP's management and restore smooth relations with local residents."[4] Another two reactors that were in the planning stage – Shin Hanul 3 and 4 – were cancelled in the aftermath of Moon Jae-in's election victory.[5,6]

The Cheonji and Daejin reactors were to be a new 1500 MWe APR+ design – the successor to the APR1400

design (of which one is operating in South Korea and four are under construction in the United Arab Emirates).[1]

KHNP had invested 90.4 billion won (US$81.1 million) into construction plans of Cheonji 1 and 2 in Yeongdeok, North Gyeongsang Province and 3.3 billion won (US$2.9 million) into Daejin 1 and 2 in Samcheok, Gangwon Province.[7]

Exports

With the prospects for new domestic reactors greatly diminished, South Korea's nuclear industry hopes to thrive in export markets. The government is actively supporting nuclear export efforts though there may be a limit to its largesse – if, for example, the South Korean government is asked to stump up billions to finance overseas reactor projects.

In 2009, a KEPCO-led consortium won the contract to build four power reactors in the United Arab Emirates. In 2010, boosted by the UAE contract, South Korea's Ministry of Trade, Industry, and Energy set a target of winning contracts to build 80 power reactors overseas by 2030, and in 2015 KEPCO had a target of winning overseas contracts for six reactors by 2020.[6] But all those targets have come to absolutely nothing – KEPCO and KHNP haven't won any reactor construction contracts since the 2009 UAE contract.

South Korea has signed nuclear cooperation agreements with at least 27 countries[8] but those agreements aren't leading to reactor contracts. The downscaling of South Korea's domestic nuclear industry won't help KEPCO and KHNP win contracts. "If Korea stops building reactors domestically it will definitely hurt their export market," said Jessica Lovering from the pro-nuclear Breakthrough Institute last year.[9]

The four recently-cancelled domestic APR+ reactors were to address some of the APR1400 design flaws (such as limited aircraft crash protection and the lack of a core-catcher) that would make it difficult to win contracts in Europe and perhaps elsewhere.

On 2 July 2018, KEPCO was short-listed to bid for a two-reactor project in Saudi Arabia along with consortia based in the US, France, China and Russia. South Korea also hopes to build 'SMART' small modular reactors in Saudi Arabia but no other country – including South Korea itself – has built a SMART reactor.

KEPCO was selected as a preferred bidder in December 2017 for Toshiba's NuGen reactor project in Moorside, Britain. That may progress but there is a long way to go. The financial requirements would test the largesse of the South Korean government, and several years would be required to go through the UK reactor licensing process.

KHNP CEO Chung Jae-hoon said in June 2018 that every effort is being made to search for opportunities in "strategic markets," including Czech Republic, Slovakia, Poland and the Philippines. "We will knock on any door, seeking whatever benefits we can get. The Korean nuclear industry can survive as long as it finds ways to complement it business model," he said.[10] However not all of those four countries will build new reactors; perhaps none of them will.

South Korea's nuclear cooperation agreement with South Africa was ruled to be illegal by the South African High Court last year. And South Africa's nuclear project is unlikely to be revived after the ousting of former President Jacob Zuma.

South Korea hoped to export reactors to Vietnam, but Vietnam cancelled its nuclear power program in 2016.

South Korea's attempts to get into the Indian nuclear market have come to nothing.[8,11]

The US Nuclear Regulatory Commission has been slowly assessing South Korea's APR1400 reactor design but even if that review is completed and successful, there is no prospect of new reactors in the US for the foreseeable future.

References:

1. World Nuclear Association, 15 June 2018, 'Early closure for Korea's oldest operating reactor', www.world-nuclear-news.org/C-Early-closure-for-Koreas-oldest-operating-reactor-1506184.html
2. Nikkei Asian Review, 19 June 2017, 'South Korea's President Moon says plans to exit nuclear power', http://asia.nikkei.com/Politics-Economy/Policy-Politics/South-Korea-s-President-Moon-says-plans-to-exit-nuclear-power
3. Heesu Lee and Stephen Stapczynski, 24 Oct 2018, 'South Korea Will Build Two of Them', www.bloomberg.com/news/articles/2017-10-24/before-abandoning-nuke-reactors-s-korea-will-build-two-of-them
4. Nam Hyun-woo, 15 June 2018, 'Wolsong-1 nuclear reactor to shut down before end of lifespan', www.koreatimes.co.kr/www/tech/2018/06/325_250740.html
5. Mark Hibbs, 22 June 2017, 'Moon's Phase-Out: What does it imply?', www.armscontrolwonk.com/archive/1203385/moons-phase-out-what-does-it-imply/
6. World Nuclear Association, Dec 2017, 'Nuclear Power in South Korea', www.world-nuclear.org/information-library/country-profiles/countries-o-s/south-korea.aspx
7. Yoon Ja-young, 21 June 2018, 'KHNP to get compensation for nuclear shutdown', www.koreatimes.co.kr/www/biz/2018/06/367_251075.html
8. Robert Einhorn, Fred F. McGoldrick, James L. Tyson, and Duyeon Kim, 16 Jan 2015, 'ROK-U.S. Civil Nuclear and Nonproliferation Collaboration in Third Countries', wp-content/uploads/2016/06/ROK-US-Civil-Nuclear-and-Nonproliferation-Collaboration-in-Third-Countries.pdf
9. Stephen Stapczynski, 16 May 2017, 'New South Korean President Seen Hindering Nuclear Ambitions', www.bloomberg.com/politics/articles/2017-05-15/new-south-korean-president-seen-hindering-atomic-export-ambition
10. Yonhap, 8 June 2018, 'S. Korean nuclear operator turns outward to foreign markets', www.koreaherald.com/view.php?ud=20180608000465
11. Anirban Bhaumik, 12 Jan 2014, 'New Delhi wary of nuclear cooperation with Seoul', www.deccanherald.com/content/380183/delhi-wary-nuclear-cooperation-seoul.html

A double first for China as Taishan EPR and Sanmen AP1000 connect to the grid

World Nuclear Industry Status Report

NM864.4741

The Chinese nuclear program scored a double world first in the space of 24 hours, when on 29 June 2018, Taishan-1, the first European/Evolutionary Pressurized Water Reactor (EPR), was connected to the grid[1], followed on 30 June 2018 by Sanmen-1, the first AP1000. The startup of these reactors marks an important milestone in the Chinese nuclear program, but they also highlight the overall failure of the nuclear industry's claims and ambitions for the EPR and AP1000 global expansion.

EPR Taishan

The Taishan reactors in Guangdong province are the largest cooperative energy project between China and France. The project is operated by TNPJVC, a joint venture established between CGN (51%), EDF (30%) and the provincial Chinese electricity company Yuedian (19%). The construction of Taishan-1 began in 2009, whilst that of Taishan-2 began in 2010. Both reactors, at that time, were due online in 2013. The two units were respectively the third and fourth EPR reactors to get underway world-wide.

According to CGN, Taishan-1 will now undergo a period of gradual power-up tests. Once the reactor has passed all these exams, it will then be tested in steady-state conditions at full power. Framatome, the EPR vendor, stated: "The successful grid connection of the Taishan 1 nuclear power plant is a historical moment for Framatome and for the whole nuclear industry."[2] In December 2017, CGN Power announced that the expected commercial operation of Taishan-2 would be in 2019.[3]

While successfully achieving grid connection, the Taishan EPR-project has experienced major delays, cost increases, and there remain major unresolved safety issues.

Taishan-1, originally scheduled to be completed in 2013, experienced a revision of this target in 2012 that put completion "in principle" at the end of 2015. Initially the delays at Taishan were due to the knock-on effects from the major delays in the AREVA EPR projects at Olkiluoto in Finland (construction start in 2005) and Flamanville in France (construction start in 2007). However, further delays emerged as result of disclosures of problems in the steel material used in the construction of parts of the pressure vessel, including top and bottom heads, at the Flamanville EPR.

Evidence of major quality control, production and regulatory oversight failure emerged in June 2014 at the AREVA le Creusot Forge steel plant. In addition to the supply of the vessel heads for the Flamanville EPR, the heads for Taishan were also manufactured at le Creusot. The French Nuclear Safety Authority (ASN), described in 2014, how it was challenging to know, what is happening at the Taishan site in contrast to the European EPR projects.[4] The issue is fundamental to nuclear plant safety, as excess carbon zones in Category 1 pressurized components increases the risks of fast fracture and rupture.[5]

In June 2017, ASN reported that the problems with the Flamanville vessel heads could also impact the top and bottom heads at Taishan EPRs, manufactured by le Creusot Forge. In October 2017, the ASN finally granted approval for the vessel heads at Flamanville, but specified that the feasibility of inspections "cannot at present be confirmed for the closure head" of the EPR and "that the current closure head cannot be used beyond 2024."[6] Unless AREVA / EDF can demonstrate the integrity of the vessel head, it will require to be replaced only a few years after start up.

In reaction to the news that the metal used in the reactor pressure vessel head and bottom was potentially unsuitable due carbon macrosegregation and reduced toughness, the Chinese government announced that it would not load fuel into the reactor until further investigations had occurred. Tang Bo, a nuclear safety administration official, told the Beijing-based newspaper *China Environment News*: "Only when problems in reactors… are identified and solved will we allow nuclear fuels to be loaded into the Taishan plant for the first time and for it to begin to operate." However, following the ASN decision, the National Nuclear Safety Administration (NNSA) issued a fuel loading permit for unit 1 in April 2018, it required CGN to develop a testing method for its reactor vessel head "as soon as possible", and that, "if developments fail or test results are unfavourable, the cover shall not be used by the end of April 2025."[7]

The other major components for Taishan-1 were all imported: the pressure vessel from Mitsubishi Heavy Industries (MHI) of Japan and the steam generators from AREVA (now Framatome) Chalon/St. Marcel in France, for Taishan-2 are all made in China: the pressure vessel by Dongfang Electric Co (DEC), two of the steam generators also by DEC and the other two by Shanghai Electric.

The Taishan EPR has also experienced multiple other problems, many related to the quality and inspection of materials, including welding. In December 2017, a Hong Kong based investigative new agency reported that the steam deaerator in Taishan-1 cracked during testing and had to be replaced.[8] At the time, CGN only admitted that there were 'partial defects' in the welding of the deaerator. CGN/EDF had subcontracted the manufacturing of the deaerator to Harbin Boiler, a subsidiary of Hong Kong-listed Harbin Electric.

The two Taishan EPR reactors.

In terms of EPR Taishan project overall costs, they remain unclear. In 2016, it was reported that CGN's 51 percent share was a total registered capital of 28.6 billion yuan (€3.6 billion). Due to increased construction costs, investment expenditure had increased 30 percent to around US$3,300/kW.[9] EDF had invested €1 billion in equity as of June 2018.[10]

Sanmen

The grid connection of the AP1000 Sanmen-1 in Zhejiang Province, was announced by Westinghouse Electric Company plant owner China State Nuclear Power Technology Corporation (SNPTC) and CNNC Sanmen Nuclear Power Company Limited (SMNPC): "Today, we witness our first AP1000 plant, Sanmen 1, began its process of generating electricity and providing our customers in China with safe, reliable and clean energy," said José Emeterio Gutiérrez, Westinghouse president and chief executive officer.[11] He added: "This milestone would not have been possible without the constant collaboration and partnership with our China customer."

Sanmen-1 is the first of a fleet of four new AP1000 plants in eastern China, with Sanmen-2 scheduled to begin operation later in 2018; two units under construction at Haiyang, in Shandong Province, with the reactors scheduled for operation in the coming months for unit 1 and in 2019 for unit 2. All four have experienced delays and cost overruns.

The AP1000s at the Sanmen and Haiyang sites were the very first constructions of this design anywhere in the world. When construction started at Sanmen, the Shaw Group, which was the Westinghouse contractor managing the doomed VC Summer project in South Carolina, but also contracted to work on supply of components to Sanmen stated that looked "to bringing this plant on line as scheduled in 2013." Cost estimates in 2017 indicated that Sanmen and Haiyang were, "over 10 billion Chinese yuan (US$1.5 billion)" over budget.[12]

The delays and cost overruns at Sanmen and Haiyang prompted one Chinese energy analyst to warn in 2015: "The only way Westinghouse can win contracts in China is to demonstrate they can build reactors quicker and cheaper than anyone else in China's market and win hearts with actions, not words… Westinghouse so far hasn't demonstrated such abilities."[13] Five years later than scheduled, the startup of Sanmen-1 makes the prospect of additional AP1000 reactor contracts in China highly uncertain.

Reality of scaled back EPR and AP1000 construction

In 2010, Westinghouse was promoting[14] the AP1000, with ambitions for 12 reactors in advanced planning stage, with a further six in China and six in India[15]. Instead, Westinghouse filed for bankruptcy in 2017[16], with three AP1000 still under construction in China and two in the U.S, and two cancelled.[17] The prospects for additional AP1000s in China remain uncertain, while India has recently announced a large scale-back of its nuclear power plans from a target of 63 GW to 22.4 GW by 2031.[18] According to reports these are to be based largely on indigenous Pressurized Heavy Water Reactors (PHRW) and Russian VVER1200 designs.

Similarly, EPR contracts have not materialized. It remains unclear whether the proposed six EPR project will actually move forward, despite the recent signing of a memorandum between France and India.[19] AREVA/Framatome's global ambitions for multiple orders for the EPR have failed, with three are remaining under construction, and two are planned in the UK. This is in contrast to the 16-20 EPR's that the company had sought but failed to secure contracts for during the last decade in Canada, Italy, Czech Republic, South Africa, United Arab Emirates, Finland and France, as well as the United States.

Reprinted from World Nuclear Industry Status Report, 2 July 2018, www.worldnuclearreport.org/A-Double-First-for-China-as-Taishan-EPR-and-Sanmen-AP1000-Connect-to-the-Grid.html

References:

1. http://en.cgnpc.com.cn/encgn/c100035/2018-06/29/content_e35b78bf6c7b4d32bde4f59d002d2ca7.shtml
2. www.framatome.com/businessnews/liblocal/docs/3_Actualites/CP/2018/PR_Framatome_Taishan_EPR_grid_connection_180629.pdf
3. http://en.cgnp.com.cn/encgnp/c100884/201712/883ae364eec7473fb27158348af7c13a/files/37c9323477e249f2baab22c63df65dd7.pdf
4. www.bloomberg.com/news/2014-06-18/french-nuclear-regulator-says-china-cooperation-lacking.html
5. https://secured-static.greenpeace.org/france/PageFiles/266171/Note_LargeAndAssociates_EN_26092016.pdf
6. www.french-nuclear-safety.fr/Information/News-releases/Flamanville-EPR-reactor-ASN-issues-its-opinion
7. www.factwire.org/single-post/2018/06/18/Troubled-Taishan-nuclear-plant-secretly-comes-online-despite-defects
8. www.factwire.org/single-post/2018/06/18/Troubled-Taishan-nuclear-plant-secretly-comes-online-despite-defects
9. www.worldnuclearreport.org/The-World-Nuclear-Industry-Status-Report-2017-HTML.html
10. http://electricityinfo.org/news/taishan-11/
11. www.businesswire.com/news/home/20180630005033/en/Westinghouse-AP1000-Plant-Sanmen-1-Begins-Synchronization
12. www.worldnuclearreport.org/The-World-Nuclear-Industry-Status-Report-2017-HTML.html#footnote-290
13. www.bloomberg.com/news/articles/2015-12-09/westinghouse-races-china-for-1-trillion-nuclear-power-prize
14. www.globalenergyinstitute.org/westinghouse-ceo-makes-global-push-market-shifts
15. www.nucnet.org/all-the-news/2018/02/20/india-confident-about-future-of-westinghouse-ap1000-deal-says-official
16. www.worldnuclearreport.org/Toshiba-Westinghouse-The-End-of-New-build-for-the-Largest-Historic-Nuclear.html
17. www.worldnuclearreport.org/Utilities-Abandon-V-C-Summer-AP1000-Reactor-Construction-Following-Westinghouse.html
18. www.worldnuclearreport.org/Toshiba-Westinghouse-The-End-of-New-build-for-the-Largest-Historic-Nuclear.html
19. www.firstpost.com/tech/news-analysis/india-signs-mou-with-companies-to-construct-six-nuclear-reactors-in-maharashtra-4602751.html

Germany: Renewables hit record high in first half of 2018

NM864.4742

Renewable energy sources provided a record 41.5% of Germany's power supply in the first half of 2018 according to Energy Charts, a website run by research institute Fraunhofer ISE.[1]

With a total net output of 113 terawatt-hours (TWh) since January, the renewables share was nearly 9% higher than during the same period last year and over a third higher than in 2014. In the first half of 2018, wind turbines produced 55.2 TWh, second only to lignite plants, which produced 66.7 TWh. Offshore wind power fed 9.1 TWh into the grid, solar power plants 22.3 TWh, hydropower 12.5 TWh, and bioenergy plants 23 TWh.

Despite the growth of renewables, problems loom. Andreas Löschel from Fraunhofer ISE told *Clean Energy Wire*: "If you look at the developments throughout the last year, it becomes clear that today the energy transition is not assigned the same political priority as it used to have some years ago."[2]

Löschel warned the *Energiewende* must not lose public acceptance due to its costs and limited success in emissions reduction to date. Germany's emissions have stagnated in recent years, partly due to a sustained period of economic growth and partly due to increasing transport emissions. Germany exported a total of 22 TWh of electricity in the first half of 2018, and was a net exporter 86% of the time.

Securing a stable power supply hinges on the development of grid capacities and storage technology, as Germany's renewable power capacity expansion continues.

Dave Elliott, emeritus professor at the Open University, UK, wrote about the *Energiewende* in May 2018:

"Public support remains very high. In a poll, 95% of the sample saw expansion of renewables as important or extremely important – up from 93% in 2016. But there are still some big policy issues. While renewables are growing, so has coal use. Although national-level use of energy from coal is now falling, gas imports are rising, with Russia keen to help.

"Gas plants can be used to balance variable renewables, so there is a case for them, but there is a push towards the use of green gas, generated from wastes or via Power to Gas conversion of surplus renewable electricity. With CCS all but abandoned, the continued use of carbon-intense coal is much more provocative, given Germany's climate protection ambitions. However, it is lucrative. With renewables taking some of the market, Germany now has regular surpluses of power, despite the phase-out of nuclear, and that surplus, mostly in effect from coal plants, is being exported very profitably.

"Coal use is being fought by environmentalists, and indeed was a key issue in the initial phase of the post-election negotiations, with the Greens requiring action on it as the price of their membership of a coalition with Merkel. Sadly, that didn't work out. Phasing out coal use and coal mining is certainly a tough call, although it is happening.

"However, despite these setbacks, it does not seem to be the case, as some insist, that Germany is replacing nuclear with coal, so that emissions are rising. The 2017 World Nuclear Industry Status report notes that, between 2010, the last year prior to the post-3/11 shutdown of the eight oldest nuclear plants, and 2016, 'the increase of renewable electricity generation (+84.4 TWh) and the noticeable reduction in domestic consumption (–20.6 TWh) were more than sufficient to compensate the planned reduction of nuclear generation (–56 TWh), enabling also a slight reduction in power generation from fossil fuels (–13 TWh) and a threefold increase in net exports'.

"Though it is the case that German emissions have been growing slightly, that's mainly due to increases from transport. That clearly needs attention. ...

"What does not seem to be in contention is the nuclear phase-out. With Gundremmingen B now closed, there are 7 plants left – all to go by 2022. But some nuclear plants are meanwhile trying to ramp up and down to stay in the game i.e. by offering balancing services. Though that can have its problems.

"With renewables expanding, there is no shortage of issues – upgrading grids to help with balancing being key, especially given local opposition to new lines. Although some bold plans are still going ahead. There are limits being imposed on biomass use, but renewables supplied over 36% of annual electricity needs in 2017, 40% of it from wind, 36% from biosources."

References:

1. www.energy-charts.de/index.htm
2. Benjamin Wehrmann, 2 July 2018, 'Renewables hit record as concerns over German govt quarrels grow', www.cleanenergywire.org/news/renewables-hit-record-concerns-over-german-govt-quarrels-grow
3. Dave Elliott, 24 May 2018, 'Germany stays on track', https://physicsworld.com/a/germany-stays-on-track/

Nuclear Energy in South Africa: Ramaphosa's mixed messages

Ellen Davies and Saliem Fakir

NM864.4743

Will government continue to pursue nuclear energy despite the exorbitant cost? And if it does, will the procurement process be more open and transparent than it was under the Zuma administration? Whether government will engage with and listen to the concerns of its people, when it comes to the controversial topic of nuclear energy, is yet to be seen.

December 2017 marked the beginning of significant political changes in South Africa. Former President Jacob Zuma was replaced by Cyril Ramaphosa as president of the African National Congress (ANC). On 14 February 2018, Zuma stepped down as president of the Republic of South Africa (RSA), almost one year short of completing his second and final term. He was replaced by the newly elected president of the ANC, Cyril Ramaphosa.

This has brought about significant changes in South Africa. However, what this means for Government's nuclear energy ambitions is not yet clear. While the Zuma administration remained unwaveringly committed to the Nuclear Energy New Build Programme in its full 9.6 GW glory, mixed messages about the future of nuclear energy have emerged from President Ramaphosa and his newly appointed Minister of Energy, Jeff Radebe.

Given this uncertainty, as well as the country's questionable track record with pursuing nuclear energy procurement under the Zuma administration, those opposed to the nuclear new build programme are left in limbo. Will government continue to pursue nuclear energy despite its prohibitively high costs; the lack of energy demand to justify a build on this scale; the fact that we don't have the money to finance it; and the continued resistance from many constituencies throughout South Africa? If it does, will the procurement process be more open and transparent than it was under the Zuma administration and will government engage with and listen to the concerns of its people?

These are critical questions because the energy choices we make now will have significant impacts not only on our energy security and economic performance today but also in the future.

Furthermore, as we enter into a new period of optimism in South Africa, the need to ensure Energy Democracy, understood in its broadest sense to mean that all South Africans are informed about and have a say in our energy future, is critical.

It is in this spirit that the World Wide Fund for Nature (WWF) undertook two studies to explore the future of nuclear energy in South Africa. The purpose of these studies is two-fold. First, it seeks to understand what we can learn from the decisions made and strategies pursued to push nuclear energy under the Zuma administration. Second, it seeks to highlight the potential points of intervention available to those seeking to oppose nuclear energy deployment, or at the very least ensure accountability in the procurement thereof.

The first study, *South Africa's nuclear new-build programme: Who are the players and what are the potential strategies for pushing the nuclear new-build programme*, maps the most vocal constituencies in the nuclear energy debate and their reasons for either opposing or supporting the new build programme. What it reveals is that across the board, irrespective of ideological positions or technology preferences, South Africans are opposed to the nuclear programme. The reasons given by these commentators include the prohibitively high costs involved, the lack of energy demand to justify the programme, the lack of finance to fund such a programme, the secrecy associated with nuclear procurement and the potential for corruption, among others.

The study also unpacks some of the lessons we can learn from government's strategy to push the nuclear programme under the previous administration. Importantly, it unpacks the Earthlife Africa and Southern African Faith Communities' Environment Institute (SAFCEI) legal challenge, which saw the Western Cape High Court declare Government's Intergovernmental Agreement with Russia unlawful and what those opposed to nuclear energy can learn from this process. It attempts to understand what, given the High Court decision, are the strategies available to Government if it is to continue to pursue nuclear energy in South Africa.

The second study, *South Africa's nuclear new-build programme: The domestic requirements for nuclear energy procurement and public finance implications*, provides insight into the various legislative requirements for large infrastructure builds in South Africa.

What it reveals is that SA has a robust legislative framework in place to ensure that due process is followed in large infrastructure procurement. In particular, Treasury's various procurement rules impose a number of checks and balances to prevent cost overruns and delays and to ensure transparency and accountability. These are critical to understand, not only in the context of nuclear energy, but for any infrastructure build we might seek to undertake.

Protest organized by Southern African Faith Communities' Environment Institute.

One of the biggest lessons we can draw from nuclear procurement under Zuma is the importance of understanding this legislative framework and where the public can intervene to ensure accountability.

The second report also shows unequivocally that SA cannot afford to pursue the nuclear new build programme. Using very conservative cost estimates, it shows not only that the fiscus can neither finance the programme nor provide the guarantees necessary to seek financial support elsewhere.

Given this, and as we move into a new period in SA's democracy, it is critical we entrench inclusive and accountable decision making from the get go. This requires that we ensure that government engages with and listens to all stakeholders when making important decisions about our energy future.

Going into this new period, we can draw on two fundamental lessons from our past. The first is that everyone has the power to make a difference. Against all odds, Earthlife Africa and SAFCEI were able to change the course of our energy future. The second is that in order to exercise this power we need to be informed.

The energy space is unnecessarily complicated. It is time for those working in this space, to move away from the technical language that excludes participation by most South Africans and start driving Energy Democracy in its truest form.

The two WWF reports are online:

Nicky Prins and Ellen Davies, 2018, 'South Africa's nuclear new-build programme: Who are the players and what are the potential strategies for pushing the nuclear new-build programme?', www.wwf.org.za/report/nuclear_new_build_programme_players_strategies

Nicky Prins, 2018, 'South Africa's nuclear new-build programme: The domestic requirements for nuclear energy procurement and public finance implications', http://www.wwf.org.za/report/nuclear_new_build_programme_domestic_requirements

Ellen Davies is WWF South Africa's Project Manager of Extractives Industry. Saliem Fakir is head of WWF South Africa's Policy & Futures Unit.

Reprinted from The Journalist, www.thejournalist.org.za/spotlight/nuclear-energy-in-south-africa-ramaphosas-mixed-messages

NUCLEAR NEWS

Belgium: Engie Electrabel fears more decaying concrete in power plants

On June 15, Engie Electrabel, the operator of Belgium's power plants, announced changes to scheduled maintenance outages at three of its reactors. During maintenance of Doel 3 in October 2017, Electrabel noticed decaying concrete in the adjacent building, where back-up safety systems are based. When Tihange 3 underwent scheduled maintenance this April, the same problem was detected.

Both outages had to be prolonged for several months. Engie said: "Since the safety requirements foresee that the bunker buildings need to withstand an external event, the operator of the plant must be able to demonstrate that this resistance is ensured at all times."

Now, Engie Electrabel has decided to extend scheduled outages of the Doel 4 and Tihange 2 reactors to determine whether the same problems are evident at these reactors. The planned outage of Doel 4 will be brought forward from November to August, while the outage planned to start at Tihange 2 in August will be extended until the end of October.

On July 5, it was revealed that there are also problems with the concrete in the reactor building of Tihange 3 itself. According to Engie Electrabel these problems have been there since the reactor was built. The nuclear safety watchdog FANC has announced that this news may lead to an even longer outage of the plant.

Due to the extended outages, Engie Electrabel estimates it will make €250 million less profit in 2018. This was before the latest problem in Tihange 3 was discovered.

Earlier this year, FANC publicly blamed Engie for the decaying concrete, claiming it was caused by a lack of upkeep by the operator.

– *WISE Amsterdam*

Whatever happened to the nuclear renaissance?

A recent opinion piece by former World Nuclear Association executive Steve Kidd in *Nuclear Engineering International* reads as a eulogy for the nuclear renaissance. Here's an excerpt:

There were signs of the renaissance in the USA. Between 2007 and 2009, 13 companies applied to the US Nuclear Regulatory Commission for construction and operating licences to build 31 new nuclear power reactors. … It is clear 15 years on, however, that the revival has not happened. Although the number of reactors under construction around the world is higher than it was then, this is largely down to China and India, plus a revival in Russia after the former Soviet Union fell apart.

The USA provided the only solid example of a rise in reactor orders, but of the 31 only four began construction and only the two units at Vogtle in Georgia are still actively at work. Even they are much delayed. The decision in 2017 by two utilities to scrap the expansion at the Summer station in South Carolina can be viewed as the end of the renaissance dream. …

The obvious question is "what went wrong"?

There was a degree of industry hype about the renaissance. It was talked up by an insular industry with its back against the wall. It also never spread very far beyond the USA, with European countries markedly less confident from the start. Some of the claims made for the Generation III reactors, particularly the costs, look laughable in retrospect.

But the industry can at least claim there have been three significant events about which it could do very little and which have adversely affected its prospects. The first of these is much cheaper natural gas prices. … The second factor is the rise of renewable energy. … The final issue is of course the accident at the Fukushima plant in Japan in 2011. ...

All these events could have been managed a lot better if the industry had put its own house in order. There were mistakes in new plant construction (combined with wider questions over economics) and a flawed communications strategy based on the climate change argument.

The industry now has to answer basic questions such as how it will fix construction cost problems of current reactors; how it will deliver a new generation of cheap, failsafe designs, and how nuclear fits in a grid dominated by cheap, variable renewables.

Construction experience with the Generation III designs in the western world has been frankly disastrous. The industry has seemingly forgotten how to manage large projects during the long fallow years. Olkiluoto, Flamanville and Vogtle are all long delayed and way over budget. The industry's economic problems have been much discussed in these columns and the answer would seem to lie in building fleets of standardized large reactors, as the French did in the 1970s and 1980s and the Chinese are working towards today. This is the opposite of what the UK is doing with its current new-build programme.

It will be difficult for the industry to move to the next generation of reactors, such as small modular reactors without investing in a programme of today's designs first.

Steve Kidd, 6 June 2018, 'The renaissance – what happened?', www.neimagazine.com/opinion/opinionthe-renaissance-what-happened-6195764/

International Energy Agency conference ponders nuclear power's bleak future

The International Energy Agency (IEA) held a high-level meeting on June 28 to identify the key issues faced by nuclear energy and to explore its future. The event was attended by ministers and senior government officials from IEA member countries, industry leaders and experts.

IEA Executive Director Fatih Birol said that "with current policies there is little prospect for significant growth for nuclear power in developed economies on the horizon". The IEA said that "under current policy frameworks, and with limited investment in new plants, the contribution of nuclear to the power mix in mature markets is set to decline significantly."

In the IEA's World Energy Outlook New Policies Scenario, nuclear power production grows with two countries – China and India – responsible for over 90% of net growth to 2040. By contrast, outside of Japan, nuclear power generation in developed economies is set to decline 20% by 2040.

International Energy Agency, 29 June 2018, 'IEA holds high-level meeting on the future of nuclear power', www.iea.org/newsroom/news/2018/june/iea-holds-high-level-meeting-on-the-future-of-nuclear-power.html

USA: The vanishing nuclear industry

An article by four current and former researchers from Carnegie Mellon University's Department of Engineering and Public Policy, published in the *Proceedings of the National Academy of Science*, argues that the US nuclear power industry faces a bleak future.

M. Granger Morgan and his colleagues argue that because of their great cost and complexity, it appears most unlikely that any new large nuclear power plants will be built over the next several decades. It further argues that no US advanced reactor design will be commercialized before mid-century.

That leaves small modular reactors (SMRs) as the only option that might be deployed at significant scale over the next few decades. The authors systematically investigated how a domestic market could develop to support a SMR industry over the next few decades – including using them to back up wind and solar and desalinate water, produce heat for industrial processes, or serve military bases – and were unable to make a convincing case.

M. Granger Morgan, Ahmed Abdulla, Michael J. Ford, and Michael Rath, July 2018 'US nuclear power: The vanishing low-carbon wedge', Proceedings of the National Academy of Science, http://www.pnas.org/content/early/2018/06/26/1804655115

Media release, 2 July 2018, 'The vanishing nuclear industry', www.eurekalert.org/pub_releases/2018-07/coec-tvn062918.php

USA: nuclear power / weapons connections surface again

A group of 75 people – including former statesmen, military, industrial and academic leaders – have written to US Energy Secretary Rick Perry imploring him to take immediate action to prevent the closure of power reactors.[1]

Their letter is blunt about the nuclear power/weapons connections that were rarely discussed and often strenuously denied just a few short years ago. The letter states:

"Several national security organizations, including our nuclear Navy and significant parts of the Department of Energy, benefit from a strong civil nuclear sector. Many of the companies that serve the civil nuclear sector also supply the nuclear Navy and major DOE programs. For example, the Administration's 2018 Nuclear Posture Review noted that the United States is unable to produce enriched uranium for national security purposes. Re-establishing this capability will be far easier and more economical with a strong, thriving civil nuclear sector."

The letter could have noted more direct connections, such as the use of power reactors to produce tritium for nuclear weapons.

As noted in Nuclear Monitor #850, statements linking nuclear power and weapons have become increasingly common and reflect the industry's desperation.[2] In a creative extension to the argument, two US-based uranium companies have lodged a petition with the Department of Commerce calling for a mandated requirement for US utilities to purchase at least 25% of their requirements from US mines. The companies, Ur-Energy and Energy Fuels, noted that uranium is "the backbone of the U.S. nuclear deterrent and fuels ships and submarines in the U.S. Navy".[3]

1. www.nei.org/CorporateSite/media/filefolder/resources/letters-filings-comments/letter-secretary-energy-rick-perry-nuclear-national-security-20180626.pdf
2. Nuclear Monitor #850, 7 Sept 2017, 'Nuclear power, weapons and 'national security'', www.wiseinternational.org/nuclear-monitor/850/nuclear-power-weapons-and-national-security
3. Nuclear Monitor #857, 14 Feb 2018, '2017 in review: Uranium is best left in the ground', https://wiseinternational.org/nuclear-monitor/857/2017-review-uranium-best-left-ground

Taiwan unable to find US company willing to take radioactive waste

Taiwan wants to export its low-level radioactive waste to the United States, but has so far been unable to find a company willing to receive the materials, Taipower Chair Yang Wei-fuu said on July 3. The waste has been stored in 100,000 barrels on Orchid Island as well as at Taiwan's three operating nuclear plants.

The Cabinet-level Atomic Energy Council said on July 2 it had asked Taipower to research how to transfer the radioactive materials to the U.S. The suggestion for the move came from the U.S. last December, but due to local laws in each state, it has been impossible to find a company willing to agree to the transfer, Taipower said. Winning the agreement of local residents was one of the requirements for companies agreeing to take the waste.

The waste was first stored on Orchid Island, a small island with a population of about 4,000, mainly indigenous Tao, in 1982. Plans to eventually dump the waste into the sea were terminated after international agreement banned the practice in 1996, leading to an accumulation of more than 100,000 barrels of waste. A committee later selected four potential new locations to store the waste, but local resistance was strong and the plan never went ahead, leading the authorities to look for overseas solutions.

The current government of President Tsai Ing-wen has declared it wants to phase out nuclear power by 2025.

Abridged with light editing from: Matthew Strong, 3 July 2018, 'Taiwan still unable to find US company willing to take radioactive waste', www.taiwannews.com.tw/en/news/3472965

India: Court rejects plea to shut down Kudankulam plant

On July 2, the Supreme Court of India rejected a plea to shut down the Kudankulam nuclear power plant until an 'Away From Reactor' (AFR) spent fuel storage facility is built, and granted the Nuclear Power Corporation of India Ltd (NPCIL) an extension until 30 April 2022 to build the facility.

In 2013, the Supreme Court directed NPCIL to have an operational AFR facility by July 2018. NPCIL requested an extension until April 2022. The Supreme Court approved the extension but warned that an extension beyond April 2022 would not be granted.

The court rejected advocate Prashant Bhushan's call to shut down the nuclear power plant until the AFR facility is ready and asked him to file an independent application to shut the reactor and not to mix the issue with NPCIL's current plea for extension of time to build the facility.

Bhushan said he was not against NPCIL's plea for extension of time to build the AFR facility, "but it is absolutely essential that the reactor is shut down for the time being till it is built ... spent fuel cannot be stored in the same compound."

In its application for an extension, NPCIL argued that establishing an AFR facility "is a challenging task on account of no previous experience with long-term storage requirements of high burn-up, Russian-type PWR fuel". As the Kudankulam reactors were 'first-of-a-kind' facilities, there is a need for considerable intensive interaction with the Atomic Energy Regulatory Board, Bhabha Atomic Research Centre and Russian specialists for technical conceptualisation and detailing of the facility, NPCIL said.

G. Sundarrajan of environmental NGO Poovulagin Nanbargal said: "How can they continue running the plant and plan to set up two more units without having the technical know-how to store the spent fuel?"

NPCIL is shifting blame and responsibility onto the Indian government, stating that management of spent fuel – including the AFR facility and a deep disposal repository – are the "primary responsibility" of the national government.

Krishnadas Rajagopal, 2 July 2018, 'SC rejects plea to shut down Kudankulam plant till AFR facility is built', www.thehindu.com/news/national/tamil-nadu/sc-refuses-plea-to-shut-down-kudankulam-plant-till-afr-facility-is-built/article24310545.ece

T.K. Rohit and P. Sudhakar, 7 May 2018, 'Spent fuel will be stored at KKNPP site itself: NPCIL', www.thehindu.com/news/national/tamil-nadu/spent-fuel-will-be-stored-at-kknpp-site-itself-npcil/article23796243.ece

T.K. Rohit, 27 Feb 2018, 'NPCIL's stand on spent fuel riles environmentalists', www.thehindu.com/news/national/tamil-nadu/npcils-stand-on-spent-fuel-riles-environmentalists/article22861045.ece