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The Indian government, which had set the ambitious target of 63 gigawatts (GW) of nuclear power capacity by 2031-32, has reduced the target to 22.5 GW. Will India meet the new target, given that current capacity is just 6.2 GW? Not likely.

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Sweden bans uranium mining

Author: Charly Hultén – WISE Sweden

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All mining of uranium in Sweden will soon be outlawed. The ban also applies to processing of residual uranium in existing tailings, and processing of uranium unearthed in conjunction with extraction of other minerals, e.g. iron, base metals and rare earth elements. Unless Parliament says otherwise, the law will take effect on August 1.

The current Red-Green coalition government, with the support of the Left Party, tabled the proposal in March. But the parties are outnumbered by a four-party non-socialist 'Alliance', plus a pro-nuclear nationalist party, and the prospects of getting the bill through Parliament appeared slim. Then, the rural-based Center Party broke ranks with the Alliance and declared their support for the uranium ban. Spokeswoman Helena Lindahl defended the party's decision: "It's clear to us that 'the renewables society' is on the doorstep, and nuclear energy has no place in it. Which means no place for uranium mining, a hazardous business, either. All things considered, we see no future in it."

The main arguments put forward by proponents of the ban concern the environmental impacts of uranium exploitation and the risks that radioactive pollution poses to human health. A third concern is the acute anxiety communities in uranium-rich regions of the country, from north to south, have experienced from time to time ever since the 1970s. Interest in Swedish uranium rises and falls with fluctuations in world market prices for the metal.

Uranium will now be stricken from the list of concession minerals in the Minerals Act, which means that no permits to prospect for, to explore or exploit uranium deposits can be issued. Relevant passages in the Environmental Code will also be altered accordingly. The inclusion of exploratory activities in the ban comes as a great relief to these communities, who have had to maintain a preparedness to organize 24/7 on-site vigils and, on occasion, non-violent obstruction, to keep concession-holders from breaking ground.

Local governments in Sweden have the right of veto when it comes to land use, including exploitation of mineral resources. But, prospecting and exploration fall under the auspices of the Mining Inspectorate, a non-elected national institution founded in 1637 to promote the country's then-fledgling metallurgic industry. The Inspectorate has on several occasions granted concessions to international prospectors, despite unanimous opposition on the part of County and local government. Furthermore, local government's right to veto mining, while set out in law, has no foundation in the Swedish constitution. Protesters have been painfully aware that it would take no more than a vote of parliament to do away with that protection.

100% imports

Sweden has quite a lot of uranium, reputedly 80 % of EU reserves, and 15% of uranium deposits worldwide. Yet, all of the uranium fuel for Sweden's shrinking nuclear energy park is imported, principally from Canada and Australia. This fact figures in the debate around the ban – perhaps surprisingly, both pro and con:

- Environmentalists are well aware that mining operations abroad are just as destructive there as they would be here at home. What is more, the impacts are borne by politically and economically disadvantaged groups. This, they reason, is yet another reason to phase out our country's reliance on nuclear energy. ASAP!
- Some die-hard advocates of nuclear energy point to the same exploitation of landscapes and peoples abroad and find it "immoral" for us to let others suffer the consequences of mining. We should, they argue, exploit our own resources. Therefore, they oppose the ban.

Bitter experience

As in many other countries, Sweden's commitment to nuclear energy was a child of the Cold War, closely intertwined with plans through the 1950s and '60s to develop a 'nuclear defense capacity'. Those plans, long held secret, came to an abrupt halt with the Nuclear Non-Proliferation Treaty in 1968.

To ensure national self-sufficiency, an open-pit uranium mine was opened in Billingen, an alum shale ridge in south-central Sweden. Operations were short-lived; mining started in 1965 and ceased in 1969. Whether it was ever profitable is a matter of debate.

But the real 'bottom line' is this: In those four years of operation, the mine and processing plant produced a total of 215 tons of uranium. And 1,500,000 tons of radioactive tailings.

The tailings were stashed in a natural depression near the processing plant, an area of about 25 hectares, which subsequently turned into a man-made lake. Unfortunately, the effects of precipitation had been grossly underestimated. In 1990, a program to mitigate leaching from the depot got under way. The program was termed successful; radioactivity in and around the 'lake' had been brought under hazard thresholds in 2006. In 2007 the program had cost SEK 250 million. Further improvements, from 2008 to the near-present, have cost an additional 200 million, at least. (That translates into approximately €50 million / US$56 million in historical prices for the period as a whole). This past January the area was declared an 'environmental risk area'. The area remains polluted, but mitigation efforts will cease. It will continue to be monitored, and uses of the area restricted.

Belgian government confirms nuclear phase-out

Author: Eloi Glorieux – Senior Energy Campaigner, Greenpeace Belgium

NM859.4718

The Belgian federal and regional governments finally reached an agreement on an Energy Pact, which is presented as the new federal energy strategy. In December 2017, the energy minister of the federal government and the energy ministers of the three regions (Flanders, Wallonia and Brussels Capital Region) reached a draft agreement – but the largest federal majority party, the Flemish-nationalist N-VA, raised objections over the economic aspects. They preconceived that the closure between 2022 and 2025 of the seven PWR's of Doel and Tihange, representing a production capacity of about 5,900 MW, would have severe economic consequences, specifically for energy intensive industries.

Over the past decades, small and middle-sized enterprises and families in Belgium paid one of the highest electricity bills of OECD countries. This made it possible for nuclear operator Electrabel to amortize its reactors within a time period of 20 years and to supply baseload power at a dumping price to the big consumers. New studies, ordered by the federal energy minister, showed that the economic impact of the nuclear phase-out would not be insurmountable.

N-VA finally gave up its resistance and on 30 March 2018 the government presented its new federal energy strategy. This strategy serves five objectives: to secure the power supply, to respect the Paris agreements on climate change, to keep the electricity bill for companies and families competitive and to sustain a high as possible safety level for the power production plants. A monitoring committee will be established to monitor the evolution of these five objectives. Before 31 December 2018, the government will present a 'National Energy and Climate Plan 2030' to the European Commission. Meanwhile, the execution of the new federal energy strategy began, with the assignment of additional zones for offshore wind parks in the North Sea. In order to enable the closure of the seven nuclear reactors between 2022 and 2025, additional gas production capacity will also be enabled and interconnections with neighboring countries will be strengthened.

Does this mean that the nuclear phase-out in Belgium is set in stone once and for all? No, as illustrated by the decisions in 2014 and 2015 to extend the lifetime of Tihange 1 and Doel 1&2, although their decommissioning was imposed by the nuclear phase-out law. The big difference, however, is that this time all political parties – majority and opposition – with the exception of one small extreme right-wing party, have agreed to the new federal energy strategy.

Greenpeace action at a Belgian nuclear power plant in 2014.

The proof of the pudding, however, is in the eating. In this respect the federal elections of 2019 will be decisive. If the governmental agreement of that new coalition confirms the nuclear phase-out unequivocally, then it will be very difficult to reverse the decision.

Meanwhile, grassroots groups from Belgium, the Netherlands and Germany – along with environmental NGOs such as Greenpeace and WISE – are requesting the immediate shut-down of Doel 3 and Tihange 2, which have thousands of cracks in their reactor pressure vessel. Recently, the city council of Liège, 25 km from Tihange, voted in favor of a resolution for the early closure of the cracked Tihange 2 reactor. There are also several court cases hanging on the decision to extend the lifetime of Tihange 1 and Doel 1&2 without having organized an Environmental Impact Assessment and cross-border public consultation processes. The outcomes of these court cases may well lead to an earlier closure of the oldest reactors than foreseen in the new federal energy strategy.

A journey to the heart of the anti-nuclear resistance in Australia: Rad Tour 2018

Author: Ray Acheson – Director, Reaching Critical Will, Women's International League for Peace and Freedom

NM859.4719

Looking at a map of South Australia's nuclear landscape, the land is scarred. Uranium mines and weapon test sites, coupled with indications of where the government is currently proposing to site nuclear waste dumps, leave their marks across the desert. But amidst the devastation these poisonous activities have left on the land and its people, there is fierce resistance and boundless hope.

Friends of the Earth Australia has been running Radioactive Exposure Tours for the past thirty years. Designed to bring people from around Australia to meet local activists at various nuclear sites, the Rad Tour provides a unique opportunity to learn about the land, the people, and the nuclear industry in the most up-front and personal way.

This year's tour featured visits to uranium mines, bomb test legacy sites, and proposed radioactive waste dumps on Arabunna, Adnyamathanha, and Kokatha land in South Australia, and introduced urban-based activists to those directly confronting the nuclear industry out in country. It brought together about 30 people including campaigners from the International Campaign to Abolish Nuclear Weapons and Reaching Critical Will, environmental activists with Friends of the Earth Australia and other organisations, and interested students and others looking to learn about the land, the people, and the industries operating out in the desert.

The journey of ten days takes us to many places and introduces us to many people, but can be loosely grouped into three tragic themes: bombing, mining, and dumping. Each of these aspects of the nuclear chain is stained with racism, militarism, and capitalism. Each represents a piece of a dirty, dangerous, but ultimately dying nuclear industry. And each has been and continues to be met with fierce resistance from local communities, including Traditional Owners of the land.

Testing the bomb

The first two days of the trip are spent driving from Melbourne to Adelaide to Port Augusta. We pick up activists along the way, before finally heading out to the desert. Our first big stop on the Tour is a confrontation with the atomic bomb.

The UK government conducted twelve nuclear weapon tests in Australia.[1] Nine took place in South Australia, at Emu Field and Maralinga. All of the tests used plutonium

– some of which may have been produced from uranium mined at Radium Hill in South Australia. The UK and Australia also conducted hundreds of so-called 'minor trials' to test the effects of fire and non-nuclear explosions on atomic bombs, which spread plutonium far and wide.

One of the tests at Emu Field in 1953 resulted in a radioactive cloud spreading over 250 kilometres northwest of the test site. This "Black Mist" is held responsible for a sudden outbreak of sickness and death amongst Aboriginal communities.[2] A Royal Commission in 1983–1984 found that the test had been conducted under wind conditions known to produce "unacceptable levels" of fallout and did not take into account the existence of people down wind of the test site. The Commission reported that regard for Aboriginal safety was characterised by "ignorance, incompetence and cynicism".[3]

The government has so far conducted four "clean ups" of Maralinga over the years.[4] Each one finds that the previous effort was insufficient. The latest "clean up" in the mid-1990s found plutonium buried in shallow, unlined pits – and much of that plutonium remains in that condition today. Nuclear engineer and whistleblower Alan Parkinson told the ABC: "What was done at Maralinga was a cheap and nasty solution that wouldn't be adopted on white-fellas land."[5]

While our Tour didn't take us to the Emu Field or Maralinga sites this time, we did visit people and lands affected by the testing in Woomera, a small town about 450 km north of Adelaide. Established as a base for a missile and rocket testing program, it is full of the ghosts of both people and weapons.

On our first night at Woomera we were joined by Avon Hudson, a nuclear weapon test whistleblower who as a Royal Australian Air Force serviceperson was assigned to work at Maralinga during the time of the 'minor trials'.

Avon gave testimony to the Royal Commission investigating UK nuclear weapon testing in the 1980s after disclosing classified information to the media starting in the 1970s. His stories, told to us around the campfire and while visiting various sites in Woomera, were full of pain. He described how those serving in the Australian military were not given information or protection against the nuclear tests, how the radioactive fallout affected Aboriginal and other local communities, and how the radioactive racism by the government continues to leave a lasting mark on current and future generations.

We visited the Woomera Cemetery, where a disturbing number of babies and children are buried. Journalist Bryan Littlely notes that the cemetery "contains 23 graves for stillborn babies born in the hospital between December 1953 and September 1968, and a further 46 graves for other children who died around that period."[6] While there has not yet been enough research to definitely prove a causal link between the weapons testing and the high numbers of stillbirths and early childhood deaths in the region, more than 100 South Australians joined a class action lawsuit against the British Ministry of Defense in 2010, demanding answers to the cause of death of their babies.[7] However, "the case was not allowed to proceed[8] because it was deemed impossible to prove radiation caused their illness."[9]

While it has so far escaped having to answer for the deaths in Woomera, the UK government did pay A$13.5

Woomera cemetery.

million in compensation to the Maralinga Tjarutja Traditional Owners in 1995. But other known victims of British testing, including members of the Kupa Piti Kungka Tjuta, have not been compensated.

Responding to the UK court's decision against the survivors, then Greens Senator Scott Ludlam wrote in a letter to the UK parliament in 2013: "Of the British and Australian veterans who were involved in the testing, and the Aboriginal people in the area at the time of the blasts, only 29 Aboriginal people have ever received compensation from the Australian Government and veterans continue to struggle to obtain the medical support they need despite experiencing unusually high rates of cancer and other ill effects associated with exposure to radiation."[9]

One of those who never received compensation or an apology was Yami Lester, Yunkunytjatjara elder and activist, who was blinded by the Emu Field nuclear weapon test in 1953 when he was ten years old. He was a key player in the Royal Commission, and went on to be a powerful advocate for land rights and against nuclear waste dumps. We didn't get to meet Yami on this Tour, because he passed away in July 2017, just two weeks after the United Nations adopted the Treaty on the Prohibition of Nuclear Weapons.[10]

Yami's daughters Karina and Rose Lester played an important role in raising support for the Treaty in Australia and participating in its negotiation in New York. Working with the International Campaign to Abolish Nuclear Weapons (ICAN), Karina delivered a statement on behalf of more than 30 indigenous groups from around the world at the negotiations, successfully advocating for provisions on victim assistance and environmental remediation, as well as a recognition of the disproportionate impact of nuclear weapons on indigenous populations.

Several of us from ICAN, the civil society coalition that advocated for years for the nuclear ban treaty, were on this year's Rad Tour. We joined to connect with and learn from those resisting other pieces of the chain of nuclear violence, and to sit on country that has been so harmed time and again.

Digging up the poison

After two days of learning about the effects of British atomic testing and visiting disturbing sites in Woomera, we headed further into the radioactive nightmare to visit a quintessential site related to the starting point of the nuclear violence chain: the Olympic Dam uranium mine near Roxby Downs.[11]

As of April 2018, two uranium mines are operating in South Australia: Olympic Dam and Beverley Four Mile. These mines produced and exported 5,493 tonnes of uranium oxide in 2016 – 63% of Australia's total production that year.[12] The only other operating uranium mine in Australia is Ranger in the Northern Territory, where mining has ceased but stockpiled ore is being processed until the mine's final closure a few years from now.

After days spent camping on the red earth of this region, it was devastating to see the massive Olympic Dam mine displacing the ground, burrowing into it with machines and metal, bringing poison up from the depths. We went on a tour conducted by BHP, the mine's operator. We were not allowed to take photos, or leave the vehicle we were on.

In addition to the uranium ore, Olympic Dam has generated over 150 million tonnes of uranium tailings – radioactive sludge that is left over after extracting the uranium-bearing minerals from the ore. Friends of the Earth describes it as a "toxic, acidic soup of radionuclides and heavy metals."[13] The tailings, and the processes used in extraction, risk the safety of workers and local communities. In the mid-1990s it was revealed that about three billion litres had seeped from the tailings dams over two years.[14] Between 2003 and 2012, BHP reported 31 radiation leaks at the mine. On our tour, we were not permitted to see the tailings dams.

The mine is also a drain on natural resources. It uses around 37 million litres of water from the Great Artesian Basin every single day. This is the largest and deepest artesian basin – a confined aquifer containing groundwater – in the world. It provides the only source of fresh water through much of inland Australia. The government and various industries use

One of the Mound Springs depleted by BHP's water take for the Olympic Dam uranium mine.

Sunrise at Lake Eyre, Arabunna land.

it, but Olympic Dam has been increasing its use since its founding. While the BHP tour guides showing us around the mine assure us that they are responsibly using the water and that it can continue to rely on the basin for at least the next 85 years of the mine's anticipated lifespan, environmental activists have serious and legitimate questions about the sustainability of this level of water usage.[15]

After our trip to the mine, we visited the Mound Springs near Lake Eyre, in Arabunna country. These are natural springs sustained by the underlying Great Artesian Basin. We were accompanied by Kokatha Traditional Owner Glen Wingfield, who, while not Arabunna, has spent his life visiting the springs. He lamented the depletion of the springs, explaining that it gets sadder to visit each time because the water levels are down more and more each and every time. Studies have shown that the pressure in the Great Artesian Basin has declined due to increased extraction.[16] As the water table drops, springs have started drying up across South Australia as well as Queensland.

Uranium mining companies, and federal and state governments, typically ignore the concerns of Traditional Owners, use divide-and-rule tactics to split local communities, provide false or misleading information, and even use legal threats – all to ensure that the uranium industry gets its way. When it comes to Olympic Dam, this racism is enshrined in legislation. WMC Resources Limited, which started the uranium mine, was granted legal privileges under the South Australian Roxby Downs Indenture Act. This legislation overrides the Aboriginal Heritage Act, the Environment Protect Act, the Water Resources Act, and the Freedom of Information Act.[17] The current mine owner, BHP, has refused to relinquish these legal privileges.

The problems of uranium mining, however, are not just local. Australia's uranium is exported around the world. It was in the Fukushima reactors that suffered a meltdown in 2011. It is converted into high-level nuclear waste in power reactors across the globe. Australia's uranium exports have produced over 176 tonnes of plutonium – enough to build over 17,600 nuclear weapons.

On the tour of Olympic Dam, it wasn't clear the BHP guides knew where their uranium was going. "Europe," said one. "I think maybe China," said another. It's a sad fact that BHP's customers include nuclear weapons states as well as countries refusing to sign the Comprehensive Test Ban Treaty or the Treaty on the Prohibition of Nuclear Weapons.

Aboriginal communities and environmental activists have long resisted the mine, from before it was even constructed. The night after we visited Olympic Dam, Glen Wingfield told us about his family's consistent activism against the mine – as well as his brief time spent working there. Conditions at the mine were awful for workers, he argues, and that's only the tip of the iceberg. The Traditional Owners were not consulted before the mine's construction, and have fiercely opposed it. They have been joined by others concerned about the mine's environmental impacts. In 2016, the Desert Liberation Front organised a "party at the gates of hell," following a protest in 2012 that saw hundreds travel from around the country to shut down the main road into the mine for four hours.[18] Protests have also been held outside BHP's Melbourne headquarters, and resource and environment ministers' offices.[19]

While BHP anticipates the mine will operate for another 85 years, opposition to its operation will continue. And while that opposition has not yet seen the closure of the mine, it likely did play a role in BHP's decision not to go ahead with its planned mega-expansion of the mine in 2012. For now, at least, the gates of hell have not been enlarged.

Dumping radioactive waste

From the gates of hell we travelled to what might be described as the gates of paradise. For now.

The federal government of Australia wants to build a facility to store and dispose of radioactive waste in

Dr Margie Beavis (Medical Association for Prevention of War), Adnyamathanha Traditional Owner Regina McKenzie and ICAN co-founder Dimity Hawkins, holding the Nobel Peace Prize medal.

South Australia, either at Wallerberdina Station near Hawker or on farming land in Kimba.[20] Wallerberdina Station is located in the Flinders Ranges, the largest mountain range in South Australia, 540 million years old. Approaching from the north on our drive down from Lake Eyre can only be described as breathtaking. The red dirt, the brown and green bush, and the ever-changing purples, blues, and reds of the mountains themselves are some of the most complex and stunning scenes one can likely see in the world.

Most people might find it shocking that the federal government would want to put a nuclear waste dump smack in the middle of this landscape. But after visiting other sites on the Rad Tour, it was only yet another disappointment – and another point of resistance.

What is known is that the Wallerberdina site is of great cultural, historical, and spiritual significance to the Adnyamathanha people.[21] It borders the Yappala Indigenous Protected Area, which is a crucial location for biodiversity in the Flinders Ranges. Its unique ecosystem provides a refuge for many native species of flora and fauna, contains many archaeological sites as well as the first registered Aboriginal Songline of its type in Australia, and is home to Pungka Pudanha, a natural spring and sacred woman's site.

In case that isn't enough, the area is a known floodplain. Our travels around the proposed site contained ample evidence of previous floods that sent massive trees rushing down the plain, smashing into each other and into various bridges and other built objects. The last big flood occurred in 2006.

The Adnyamathanha Traditional Owners were not consulted before their land was nominated for consideration by the government for the waste dump. "Through this area are registered cultural heritage sites and places of huge importance to our family, our history and our future," wrote Adnyamathanha Traditional Owners in a 2015 statement.[22] "We don't want a nuclear waste dump here on our country and worry that if the waste comes here it will harm our environment and *muda* (our lore, our creation, our everything)."

We met Adnyamathanha Traditional Owners Vivianne and Regina McKenzie, and Tony Clark, at the proposed site. They invited us into the Yappala Indigenous Protected Area to view the floodplains and swim in the beautiful Pungka Pudanha. We'd just been camping at Wilpena Pound in the Flinders Ranges National Park only a few kilometres away. It is impossible to understand the government's rationale for wanting to build a toxic waste dump on this land so cherished by its Traditional Owners, local communities, and tourists alike.

The McKenzies have been working tirelessly to prevent the proposed dump from being established, as have other local activists. Fortunately, they have some serious recent successes to inspire them.

In 2015, the federal government announced a plan to import 138,000 tonnes of high-level nuclear waste from around the world to South Australia as a commercial enterprise. But Traditional Owners began protesting immediately, arguing that the so-called consultations were not accessible and that misinformation was rife.[23] In 2016, a Citizen's Jury, established by then Premier Jay Weatherill and made up of 350 people, deliberated over evidence and information. In November that year, two-thirds of the Jury rejected "under any circumstances" the plan to import or store high-level waste.[24] They cited lack of Aboriginal consent, unsubstantiated economic assumptions and projections, and lack of confidence in the governmental proposal's validity.

Other battles against proposed nuclear waste dumps have been fought and won in South Australia. From 1998 to 2004, the Kupa Piti Kungka Tjuta, a council of senior Aboriginal women from northern South Australia, successfully campaigned against a proposed national nuclear waste dump near Woomera.[25] In an open letter in 2004, the Kungkas wrote: "People said that you can't win against the Government. Just a few women. We just kept talking and telling them to get their ears out of their pockets and listen. We never said we were going to give up. Government has big money to buy their way out but we never gave up."[26]

Connected communities

The attempts by the Australian government and the nuclear industry to impose a waste dump in the Flinders Ranges, just like their attempts to impose waste dumps and uranium mines elsewhere in the country, or their refusal to compensate victims and survivors of nuclear testing, are all mired with racism. They are rooted in a fundamental dismissal and devaluation of the lives and experiences of indigenous Australians, and of

communities they consider "remote" – both in their proximity to cities but more importantly, to power.

The industry and government's motivations for imposing nuclear violence on these people and this land are militarism and capitalism. Profit over people. Weapons over wellbeing. Their capacity for compassion and duty of care has been constrained by chronic short-termism – a total failure to protect future generations. The poison they pull out of the earth, process, sell, allow others to make bombs with, and bury back in the earth, wounds us all now and into the future.

But nuclear weapons are now prohibited under international law. New actors are challenging the possession of nuclear weapons in new ways, and nuclear-armed states are facing a challenge like never before. The nuclear energy industry – and thus the demand for uranium – is declining. Power plants are being shuttered; corporations are facing financial troubles. Dirty and dangerous, the nuclear industry is dying.

This is in no small part due to the relentless resistance against it.

This resistance was fierce throughout all of the country we visited, from Woomera up to Lake Eyre, from Roxby Downs to the Flinders Ranges. We listened to stories of those living on this land, we heard their histories, witnessed their actions, and supported their plans.

And, we were able to share something special with many of them: ICAN's Nobel Peace Prize.

Awarded in 2017, the Prize recognizes ICAN's efforts to highlight the humanitarian impacts of nuclear weapons and to work with governments to negotiate and adopt the nuclear weapon ban treaty. But the Prize is not just for those advocates directly involved in that aspect of the campaign's work. It's a recognition of all the efforts of anti-nuclear activists through the long history of the atomic age, activists who have put their bodies on the line in defence of the earth and human health, in protection of our planet, in opposition to governments that pull poison out of the ground and drop it on human beings and animals around the world.

Sharing the Nobel Prize with the resisters in South Australia was a deep joy. It seemed to bring inspiration and invigoration to many who have fought for so long against impossible odds in difficult places against powerful corporations and governments. It was a humbling reminder of the collective effort of all our advocacy and activism across time and space. We're all connected, and we cannot do this alone. Movements are made of people, reaching out across borders, across struggles, to cultivate solidarity and strength in one another. Resistance is fertile.

Information on previous Rad Tours is posted at www.nuclear.foe.org.au/radtour

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Indian government slashes nuclear power target by two-thirds

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The Indian government, which had set the ambitious target of 63,000 MW of nuclear power capacity by 2031-32, has reduced it to 22,480 MW.[1] "With the completion of the under construction and sanctioned projects, the total nuclear power installed capacity in the country will reach 22,480 MW… by the year 2031," said Minister Jitendra Singh.

The new target is a little over one-third of the target of 63,000 MW by the year 2031-32, announced by the Department of Atomic Energy (DAE) in April 2015.

In 2015, the 2024 target was 47,80 MW; now, the 2024 target is 13,480 MW according to the Minister.

Pro-nuclear commentator Dan Yurman wrote:[2]

"It appears that India's long list of nuclear reactors, which at one time it aspired to build, is now in the dust bin. Instead, a much shorter list of 19 units composed of indigenous 700 MW PHWRs and Russian VVERs will be completed for an additional 17 GWE. ... The list of 57 cancelled reactors also includes 700 MW PHWRs and Russian VVERs. In addition it includes future plans for Areva EPRs and Westinghouse AP1000s. Four fast breeder reactors are part of this list which raises questions about India's policy commitment to its three phase plan for nuclear energy.

"While the Department of Atomic Energy did not specify the reasons for the change, it is likely that India has come face-to-face with the same reality that other developing nations seeking rapid construction of nuclear power plants. The challenges are the lack of funding, a reliable supply chain that can handle a huge increase in orders, and a trained workforce to build and operate the plants at the planned level of activity."

Will India meet the new target of 22,480 MW by 2031? Not likely given that current capacity is 6,200 MW, reactors under construction amount to 4,350 MW capacity, and nuclear power accounted for just 3.2% of electricity generation in 2017.

Yurman warned about the implications of the underperforming nuclear sector: "The decision has enormous implications for expanding use of coal for electrical power generation and for release of CO2, other greenhouse gases, and for adding to India's dire air pollution problems in its major cities. The drastic reduction in planned construction of new reactors will diminish India's plans to rely on nuclear energy from 25% of electrical generation to about 8-10%. The balance of new power requirements will likely be met by use of India's enormous coal deposits."

However a recent Bloomberg New Energy Finance (BNEF) report found that the cost of wind and solar power has declined dramatically over the past year in India, well beyond the global average. According to BNEF: "Taking India as an example, BNEF is now showing benchmark LCOEs [levelized costs of electricity] for onshore wind of just $39 per MWh, down 46% on a year ago, and for solar PV at $41, down 45%. By comparison, coal comes in at $68 per MWh, and combined-cycle gas at $93. Wind-plus-battery and solar-plus-battery systems in India have wide cost ranges, of $34-208 per MWh and $47-308 per MWh respectively, depending on project characteristics, but the center of those ranges is falling fast."

Research released by Greenpeace India in December 2017 found that at least 65% of India's coal power generation in financial year 2016 – representing 94 GW of installed capacity – was being sold to distribution companies at a higher cost than power from new renewable energy projects.[4] The analysis showed that replacing the most expensive coal power plants with electricity generated by solar PV and wind would save consumers up to 54,000 crores (US$8.3 billion) annually. Just replacing older, expensive plants – those older than 20 years – would still yield 20,000 crore (US$3 billion) in reduced power purchase costs annually.

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NUCLEAR NEWS

South African women awarded Goldman Prize

Two remarkable South African women, Makoma Lekalakala and Liz McDaid, were among the recipients of the prestigious Goldman Prize, announced on April 23. Lekalakala (director of Earthlife Africa) and McDaid (climate change coordinator for Southern African Faith Communities' Environment Institute) were recognized for their central role in the campaign against new nuclear power reactors.

The Guardian reported:

"Two grassroots women activists – one black, one white – stand together against two of the world's most powerful men – one black, one white – over a secret, undemocratic, multibillion dollar nuclear deal. If this was the plot of a Netflix series, it might be dismissed as too neat, too perfectly symbolic and symmetrical. But this is the true story of the two South African winners of this year's Goldman environment prize who tapped their roots in the anti-apartheid struggle to take on and beat an agreement by their nation's recently deposed leader Jacob Zuma and Russian president, Vladimir Putin.

"Makoma Lekalakala and Liz McDaid were the sole signatories of a successful legal challenge against the plan for South Africa to buy up to 10 nuclear power stations from Russia at an estimated cost of 1tn rand ($76bn). After a five-year legal battle, a high court outlawed the deal last April and accepted the plaintiffs' claims that it had been arranged without proper consultation with parliament. Aside from the immense geopolitical ramifications, the ruling was a vindication for the civil society movement that aims to expand public participation, especially by woman, in energy decision-making.

"There were risks in confronting the president, the electricity utility and the interests of a foreign power. The two women were warned they could face violence and attacks on their reputation, but they signed the legal papers regardless. "It is important that this campaign is led by women," Lekalakala said in an interview in Cape Town. "We are getting this prize because we really sacrificed ourselves by putting our names on the line. Others were shit-scared. But we've been through so much that we were willing to take the risk.""

Liz McDaid and Makoma Lekalakala.

Lekalakala told *New Internationalist*: "When the judge made the announcement that we got everything we had asked for, I broke down in tears." McDaid added: "And I shouted right there in court, although I knew that you have to keep silent in court. So many times we thought that the forces against us were too great. Our first court appearance got postponed and we were running against time. They attempted to block us, to wear us out, to make us run out of money – we did run out of money, but our legal team were amazing: they kept carrying on – but all this only made us more determined to fight."

Jonathan Watts, 23 April 2018, 'Goldman prize awarded to South African women who stopped an international nuclear deal' www.theguardian.com/world/2018/apr/23/goldman-prize-awarded-to-south-african-women-who-stopped-an-international-nuclear-deal

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'Makoma Lekalakala & Liz McDaid – 2018 Goldman Prize Recipients', www.goldmanprize.org/recipient/makoma-lekalakala-liz-mcdaid/

Hinkley Point C – ONR concerns

The UK's Office for Nuclear Regulation (ONR) has raised concerns with EDF Energy over management failings that could affect safety at the Hinkley Point C power station if left unaddressed. ONR identified five key areas of supply chain management where improvements are needed ahead of acceleration in both construction and manufacturing for the project. ONR has rated an overall inspection finding as 'amber'. This means that some arrangements are below standard and the ONR is seeking improvements. The five key areas include issues such as improvement programmes, lessons learned, self-assessment and quality assurance.

More information:

nuClear news No.106, April 2018, www.no2nuclearpower.org.uk/wp/wp-content/uploads/2018/04/NuClearNewsNo106.pdf

Abandoning Hinkley Point C now could save consumers billions

The Stop Hinkley Campaign has submitted a joint response, with the Nuclear Free Local Authorities (NFLA), to the UK Government's call for evidence on Professor Dieter Helm's review of the UK energy market and the financial costs of energy to consumers and businesses.[1] The joint submission argues the best way for the Government to keep electricity costs to consumers as low as possible over the coming decades, while reducing carbon emissions, and providing secure electricity supplies, is to cancel Hinkley Point C, scrap the new nuclear programme, launch a much more comprehensive energy efficiency programme and expand renewable energy ambitions.

The response also notes:

- Cancelling Hinkley Point C now might incur a cancellation cost of around £2bn, but consumers could save around £50bn over its lifetime.[2]
- Offshore wind is already approaching half the cost of nuclear power and Bloomberg New Energy Finance predicts costs will drop a further 71% by 2040.
- Removing the current block on onshore wind could save consumers around £1bn.
- Solar power is expected to be the cheapest source of energy (not just electricity) anywhere in the world by 2030 or 2040.
- Cost-effective investments in domestic energy efficiency between now and 2035 could save around 140 terawatt hours of energy and save an average of £270 per household per year at current energy prices. The investments would deliver net benefits worth £7.5bn to the UK.
- Renewables could soon be producing enough electricity to power the grid from April to October. If the Government continues with the nuclear programme then Ministers will have to explain to consumers why they are having to pay for expensive nuclear electricity when cheap renewables are being turned off.

Stop Hinkley spokesperson Roy Pumfrey said: "The cost of renewables is declining rapidly, and it is becoming increasingly clear that there are lots of ways of dealing with intermittency issues. It now looks as though Hinkley Point C won't be online before 2027. Several financial institutions have predicted that large centralised power stations are likely to be obsolete within 10 to 20 years, because they are too big and inflexible, and are "not relevant" for future electricity. So Hinkley Point C and the rest of the UK's ill-conceived new nuclear programme will be too late, too expensive and too problematic. Wind and solar are cheaper more flexible and much quicker to build. It is time to cancel Hinkley Point C now before consumers are saddled with a needless bill for £50bn not to mention the nuclear waste which we still don't know what to do with."

1. www.nuclearpolicy.info/wp/wp-content/uploads/2018/01/A283_NB170_Helm_cost_of_energy_review.pdf
2. Emeritus Professor Steve Thomas, 'Time to Cancel Hinkley Point C', www.no2nuclearpower.org.uk/wp/wp-content/uploads/2017/09/Time-to-Cancel-HinkleyFinal.pdf

Generation IV R&D "a growing challenge"

The OECD Nuclear Energy Agency noted in its March 2018 monthly bulletin that "maintaining existing facilities operational is a growing challenge" for members of the Generation IV International Forum (GIF).[1]

The Nuclear Energy Agency was reporting on a February meeting of the Forum's new task force, established to identify R&D facilities needed for the development of Generation IV systems. Presentations were made by the representatives of the six systems that GIF member countries are exploring – gas-cooled fast reactors, sodium-cooled fast reactors, lead-cooled fast reactors, molten salt reactors, supercritical water-cooled reactors, and very high temperature reactors – highlighting existing R&D capabilities and also gaps.

Filling those gaps will presumably be difficult if, as the Nuclear Energy Agency states, just maintaining existing facilities operational is a growing challenge.

Industry bodies such as the Nuclear Energy Agency are typically more bullish about Generation IV prospects. However the timelines are repeatedly deferred:

Generation IV reactors were 20 years away 20 years ago, they are 20 years away now, and they will likely be 20 years away 20 years from now.

The Generation IV International Forum states: "It will take at least two or three decades before the deployment of commercial Gen IV systems. In the meantime, a number of prototypes will need to be built and operated. The Gen IV concepts currently under investigation are not all on the same timeline and some might not even reach the stage of commercial exploitation."[2]

The International Atomic Energy Agency states: "Experts expect that the first Generation IV fast reactor demonstration plants and prototypes will be in operation by 2030 to 2040."[3] A 2015 report by the French government's Institute for Radiological Protection and Nuclear Safety (IRSN) 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."[4]

The World Nuclear Association noted in 2009 that "progress is seen as slow, and several potential designs have been undergoing evaluation on paper for many years."[5]

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New 'controllable renewable energy plant' competitive with nuclear power

Abridged from Energy Post Weekly:

Eastern European countries that are considering building new nuclear plants could also opt for building "controllable renewable energy plants", according to a new study from Berlin-based consultancy Energy Brainpool commissioned by Greenpeace Energy. The two options are comparable in cost, according to the study.

A "controllable renewable energy plant" consists of a combination of wind/solar power with a power-to-gas facility and gas turbine. The power-to-gas facility and gas turbine act as a backup when there is no power available from wind or sun. This addresses the key shortcoming of intermittent renewable energy. In the concept the gas turbine is fully powered by electrolysis-gas, so the installation is fossil-fuel-free.

Currently, nuclear power projects in Hungary, the Czech Republic and Slovakia are all still in the planning phase:

Hungary is planning two new reactors with a total capacity of 2,400 MW to be finished in 2026.

The Czech Republic is also planning the construction of two new reactors, also 1,200 MW each, at the existing Temelin and Dukovany sites.

Slovakia wants to replace its Bohunice reactor (1,200 MW) in the mid-2020s and is already building two small new reactors, Mochovce 3 and 4 (total 900 MW), which are supposed to come online this year and the next. Slovakia is also planning a new plant at Kecerovce (1,200 MW).

Poland, which does not have any nuclear plants at the moment, also has plans for a new nuclear power plant of 3,000 MW which should go online in 2029, but this is in the pre-development phase, with no location chosen yet.

The study presents detailed estimates of the costs of both options. For the nuclear power plants, it includes budgeted costs of the new Flamanville plant which is being built by EDF in France, and the subsidy awarded to Hinkley Point C, also to be built by EDF.

The study notes that the budgeted costs for nuclear power are probably too low. Taking Flamanville and Hinkley Point C as more realistic estimates, the controllable renewable energy plants are comparable in price, except in Slovakia. It further adds that financing conditions for renewable energy are quite difficult at the moment. If better conditions could be realized, e.g. through EU intervention, costs would go down significantly.

The study concludes that controllable renewable energy plants are a good alternative for new nuclear plants: "With comparable costs, this kind of system produces electricity with the same consistent security of supply, high energy independence, and minimal effect on the climate." These systems are also more flexible and more scalable and imply no dependence on Russian technology or materials.

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Is China losing interest in nuclear power?

chinadialogue researcher Feng Hao writes:

Policymakers may cite various strategic reasons for backing nuclear power but there is a question mark hanging over the sector's future growth. China has 20 gigawatts of nuclear power capacity under construction but plans for additional capacity are being delayed. A 2020 target of 58 gigawatts of installed nuclear capacity now looks out of reach. The National Energy Administration did not approve any new nuclear plants between 2016 and 2017. In 2017, only three new reactors started operating.

Shi Lishan, head of the nuclear power office at the National Energy Administration, admitted at a meeting of the Chinese Society for Electrical Engineering last year that, "achieving targets set in the past now looks uncertain, with reactors that have been built and that are ready for fuelling and going into operation also on hold."

Reasons for the shift, according to Shi, include mixed attitudes towards new nuclear power within government, and the over-supply that's affecting China's power generation sector. As China's economic growth has eased, so too has the growth in electricity demand. In 2015, electricity consumption rose just 0.5%, the lowest in 40 years.

"Work out supply and demand and you can see that the market is unable to absorb any more nuclear power," Kang Junjie, chief engineer with Dongdian Wanwei Technology (Beijing) told *chinadialogue*.

This leaves little room for expansion of electricity generation, meaning fierce competition between nuclear, solar, wind and hydropower. Globally, solar and wind are replacing nuclear power as the first choice for new power generation. This is true in China, too.

Cost is a key factor: the earlier nuclear power plants are now in the mid-to-late stages of their lifecycle, with operational and maintenance costs rising, according to Kang Junjie. Meanwhile, renewables are in the ascendant, with costs continuing to fall.

Analysis by Bloomberg New Energy Finance predicts that the cost of power from China's onshore wind and solar will drop below that of coal in 2019 and 2021, respectively, suggesting that the cost advantage of nuclear power over renewables will only last a few more years.

Abridged from:

Feng Hao, 19 March 2018, 'Is China losing interest in nuclear power?', www.chinadialogue.net/article/show/single/en/10506-Is-China-losing-interest-in-nuclear-power-?mc_cid=e08503abda&mc_eid=da6e209b80

New solar eclipsed fossil fuels in 2017

A UN-backed report finds that a record 157 gigawatts (GW) of new renewable electricity capacity was added worldwide in 2017, more than double the amount of new capacity from fossil fuels.[1]

Globally, a record 98 GW of solar power capacity was installed last year with China contributing more than half (53 GW), according to UN Environment, the Frankfurt School-UNEP Collaborating Centre and Bloomberg New Energy Finance.

New renewable capacity of 157 GW – also including wind, bio-fuels and geothermal energy – more than doubled the 70 GW of net new capacity from fossil fuels in 2017. (Nuclear power capacity fell by 1.3 GW in 2017 as discussed in Nuclear Monitor #856).

"We are at a turning point from fossil fuels to the renewable world," said Erik Solheim, head of UN Environment. "The markets are there and renewable energy can take on coal, it can take on oil and gas."

Meanwhile, a separate Bloomberg New Energy Finance (BNEF) report finds that the average cost of solar PV (US$70/MWh) and onshore wind (US$55/MWh) has fallen by 18% in the past year alone and the cost of lithium-ion batteries has fallen 79% since 2010.[2]

BNEF says its latest report on the levelized costs of electricity, or LCOE, finds that fossil fuel power is facing an unprecedented challenge in all three roles it performs in the energy mix – the supply of 'bulk generation,' the supply of 'dispatchable generation,' and the provision of 'flexibility.'

Elena Giannakopoulou, head of energy economics at BNEF, said: "Some existing coal and gas power stations, with sunk capital costs, will continue to have a role for many years, doing a combination of bulk generation and balancing, as wind and solar penetration increase. But the economic case for building new coal and gas capacity is crumbling, as batteries start to encroach on the flexibility and peaking revenues enjoyed by fossil fuel plants."

However, as Energy Post Weekly notes[3], another recent report provides a reality check. The report – 'Tracking SDG7: The Energy Progress Report' – was published by the World Bank Group, the International Energy Agency, the International Renewable Energy Agency, the United Nations Statistics Division, and the World Health Organization.[4] It considers broad energy issues rather than just electricity generation, and finds that:

- the share of renewable energy is declining in numerous countries;
- patterns of energy intensity – primary energy demand per unit of gross domestic product – are mixed (the global reduction in energy intensity in 2017 of 1.7% was weaker than the average reduction of 2.3% over the previous three years).
- global CO2 emissions rose 1.4% in 2017 after remaining flat for three years;
- energy demand grew an estimated 2.1% in 2017, double the rate of increase in 2016; and
- in 2017, the carbon intensity of energy supply – CO2 emissions per unit of total primary energy supply – increased for the first time in three years as fossil fuels met over 70% of the growth in energy demand.

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South Africa: Yellowcake blues in Karoo

We noted in Nuclear Monitor #857 that the uranium industry's downturn might be reversed by decisions taken by Cameco (Canada) and Kazatomprom (Kazakhstan) in late 2017 to significantly reduce production. However those decisions have not yet had any impact. Indeed the spot price and long-term contract price have both declined this year and the long-term price has fallen below US$30 / lb U3O8 for first time since April 2005.[1]

The latest casualty is Western Australia-based Peninsula Energy Ltd., which confirmed in late April its withdrawal from any further development of the Karoo uranium project in South Africa.[2,3] Managing director Wayne Heili said: "In this enduring difficult uranium market, it has proven unrealistic to attribute any value to the Karoo project."[2]

Over the remainder of 2018, the activities at Karoo will focus on the rehabilitation of exploration and historical trial mining activities. Peninsula Energy claims that progress has already been made with the rehabilitation of more than 6,000 boreholes.[2]

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UK reactor cracks the beginning of the end

EDF Energy has announced that reactor #3 of its Hunterston B nuclear power plant in Scotland will remain offline while new cracks are investigated in the reactor's graphite core. It is an Advanced Gas-cooled Reactor (AGR), operating since 1976.

The latest cracks have appeared quicker than anticipated according to World Nuclear News.[1] The integrity of the thousands of graphite blocks that make up the reactor core is vital to nuclear safety – they ensure that the reactor can be cooled and safely shut down in an emergency – but bombardment by intense radiation over decades causes the blocks to start cracking.[2]

If the graphite blocks are weakened, there's a chance an earthquake or modest tremor could trigger a meltdown and radioactive release, consultant John Large told *Deutsche Welle*. "EDF can't do anything physically to resolve the situation. The bricks were never designed to be replaced. In fact, it's entirely inaccessible inside the reactor's core," he said.[3]

The Office for Nuclear Regulation (ONR) said it was informed in March 2018 that additional cracks had been found during planned inspections of the graphite blocks. EDF Energy said the inspections "confirmed the expected presence of new keyway root cracks in the reactor core and also identified these happening at a slightly higher rate than modelled".[1]

EDF said reactor #3 will remain offline while the company works with the regulator on a safety case and that it expects the reactor – which was originally planned to operate until 2011 – to be restarted before the end of this year.[1]

The outage is the longest yet over the graphite issue, which EDF calls a "unique challenge", and company presentations concede the cracking "will probably limit the lifetime for the current generation of AGRs".[4]

Nuclear critic and consultant Pete Roche pointed out that Hunterston is now 42 years old and he doubts that it will be restarted. "This must surely be the end for reactor three," he said.[2]

The problems with reactor #3 at Hunterston B raise questions over the future of six other AGRs operating in the UK – Torness, Hinkley Point B, Hartlepool, Heysham 1 and 2, and Dungeness B. Large said: "They all have the same aging problem. They were all built in the 70s and 80s, and that means that all of them have reached this threshold limit when the key-route cracking becomes a problem."[3]

"We are gambling with public safety by extending the lives of old reactors," Roche said. He expects Hinkley Point B to close "very soon", followed by others. "Even Torness has passed the 30-year threshold, so may not make it to its expected 2030 closure date."[2]

Hinkley Point B, which came online in 1976, is offline to carry out checks for cracks. The reactor has been providing power for the 3,500-strong workforce constructing Hinkley Point C.[4]

The temporary shutdown of reactor #3 at Hunterston B is expected to cost EDF Energy an estimated £120m in lost revenue.[4] A Bernstein Bank analyst said it would also hurt the price British Gas's parent company, Centrica, would fetch for its stake in the plants. Centrica recently said it hoped to sell its 20% share of in EDF Energy Nuclear Generation, which owns Britain's existing eight nuclear power stations, by 2020.[4]

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US House of Reps approves dodgy fast reactor project

Dr Ed Lyman, senior scientist with the Union of Concerned Scientists, writes:

The Union of Concerned Scientists (UCS) supports a moderate level of Department of Energy (DOE) research funding to make nuclear power safer and more secure—for example the agency's program to develop accident tolerant fuels for nuclear reactors. Conversely, UCS does not support programs that not only would cost a lot of money, but also could make nuclear power more dangerous and less secure. That's why the organization is troubled by a bill that was passed by the House of Representatives on February 13.

The bill in question, H.R. 4378, authorizes the secretary of energy to spend nearly $2 billion over the next seven years to build what's called a "versatile reactor-based fast neutron source." As its name indicates, the primary purpose of this facility would be to provide a source of high-energy neutrons to help researchers develop fuels and materials for a class of advanced nuclear reactors called fast reactors.

What may not be clear from the name is that this facility itself would be an experimental fast reactor, likely fueled with weapon-usable plutonium. Compared to conventional light-water reactors, fast reactors are less safe, more expensive, and more difficult to operate and repair. ...

The amount of funding authorized by H.R. 4378 for designing and constructing this fast reactor is less than 60 percent of its estimated cost of $3.36 billion ... It's also important to keep in mind that the estimated cost of $3.36 billion is just a fraction of the project's total cost. It does not include a facility to fabricate the plutonium fuel, which could add billions to the final price tag.

Abridged from:

Ed Lyman, 15 Feb 2018, 'The "Versatile Fast Neutron Source": A Misguided Nuclear Reactor Project', https://allthingsnuclear.org/elyman/a-misguided-nuclear-reactor-project