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# Westinghouse officials visit India: displacing vulnerable communities to revive desperate nuclear industry

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*NM857.4705*

As senior Westinghouse officials visit India this month, the nuclear industry's PR machine has drummed up news of the revival of its nuclear project in Kovvada, on the country's eastern coast.[1] When recently the Canadian firm Brookfield acquired Westinghouse from Toshiba and salvaged it from complete bankruptcy, similar hopes were raised in the Indian media.[2] The visit of Westinghouse officials has invited protest on the ground[3], as well as an international solidarity statement which activists from across the world are signing.[4]

The Westinghouse project in India has been in the pipeline since 2005 and was supposed to be the first imported reactor to materialize after the United States opened the doors of global nuclear commerce for India, ending the international embargo against it in an unprecedented nuclear deal. However, the project been a tale of abject failures, false promises, manipulations and brazen undermining of basic norms.

## A tale of desperation

Initially, the Westinghouse project was announced on the western coast – in Gujarat's Mithi Virdi. Amid massive agitation[5] by local farmers and withdrawal of environmental clearance by India's National Green Tribunal for the project[6], the project was shifted to Andhra Pradesh last year.[7] In Kovvada, originally the project was awarded to GE-Hitachi, which pulled out in 2015 citing its reluctance to commit liability as per the Indian domestic law.[8] However, the Secretary of India's Department of Atomic Energy later announced that India had canceled the project as GE-Hitachi do not have an operating reactor of that design anywhere else in the world.[9]

That is also true about EPR design reactors being built in Jaitapur and Westinghouse's AP1000 design too, which is now scaled up to 1,208 MW for Kovvada. Unending delays, cost escalations and regulatory troubles with the AP1000 reactors have been held responsible for bankrupting Westinghouse in the US.[10]

Ahead of the Indian Prime Minister Narendra Modi's visit to the US last year, the Kovvada project was deemed 'Make In India', implying that Westinghouse will only provide technology and components now, and not a turn-key project as negotiated initially.[11] The reactor construction in Kovvada – if the project goes ahead – will now be conducted by Indian partners under the overall management of the Nuclear Power Corporation of India Limited (NPCIL).[12] Although the Indian government boasts of such "indigenisation" as a great way of technology-transfer and minimizing nuclear costs, it is actually a perverted way to justify nuclear imports despite the global decline of the nuclear industry. The entry of Indian contractors with no experience in the nuclear sector also has serious safety implications.

## Unending attempts to undermine nuclear liability

After India opened its nuclear sector for global players, the nuclear lobbies wanted India to enact a domestic law which does not hold suppliers liable in case of a future accident. The previous government under Manmohan Singh drafted a bill accordingly and it made its way to the industry chambers even before it was put before the parliament.[13] However, the Supreme Court judgement in Bhopal in 2010 created a sensitive atmosphere[14] and under the pressure of civil society and progressive parties, the government had to insert a special provision – clause 17(b) of the Civil Liability for Nuclear Damage (CLND) Act 2010 – under which the country's government-owned nuclear operator (but not victims of a disaster) has a limited 'right of recourse' to make the nuclear suppliers pay part of the total liability in case of an accident.[15]

The industry – both domestic[16] as well as international lobbies including the American[17], Canadian[18], French[19] and Russian[20] corporations, have been reluctant to accept this provision. In particular, and soon after the grand nuclear bargain was signed with India in 2005, the US has insisted on a liability-free market.[21] To placate US interests, the Indian government has been trying every way to undermine the domestic law mandated by its sovereign parliament to protect Indian people.

At least six such attempts can be listed here:

1. After enacting the bill into law, the government was supposed to introduce rules for its implementation, but it designed them in such a way that CLND Rules 2011 went against the letter and spirit of the Act.[22] The Department of Atomic Energy (DAE), responsible for drafting the Rules, sneakily introduced a "product liability period" of a ridiculously short five years and further capped the liability to the value of the contract or the liability of the operator. The Parliament's Standing Committee strongly criticized the DAE for diluting and contradicting the Act.[23]
2. The previous PM Manmohan Singh, during his visit to the US in 2013, came up with a novel 'interpretation' of the liability law, and the government's Attorney General claimed that in case of an accident, claiming liability from the suppliers is 'optional' for the operator.[24] This posture to placate the US was considered Manmohan's gift to the US.[25] To be true to this circumvention, the NPCIL itself has been claiming that it will not claim liability in case of an accident.[26]

3. In other similar tactics, the US forced India to sign[27] and then ratify[28] the Convention on Supplementary Compensation (CSC), an industry promoted template that completely indemnifies suppliers in case of nuclear accidents. Since then, the US has been using this as a stick against India, insisting that India must change its domestic law to make it consistent with the CSC.[29]
4. Ever since 2012, the US and Indian governments have set up a formal 'joint committee', essentially to find ways to circumvent the liability law.[30]
5. After assuming power as Prime Minister, Narendra Modi conveniently shred his party's reservations on diluting nuclear liability and announced a 'breakthrough' with the United States in 2015 during the Delhi visit of President Obama.[31] Under this, the government formed the 'Indian Nuclear Insurance Pool' of 15 billion rupees (US$233 million) to channel suppliers' liability to public coffers in case of an accident. It was the Modi government that ratified the CSC in 2016 purportedly to woo foreign nuclear investment.[32]
6. More recently, the NPCIL announced its own 'Liability Policy' in 2016 aimed at accommodating the concerns of nuclear suppliers by limiting the insurance premium to about 1 billion rupees (US$15.5 million).[33]

It is outrageous that so much arm-twisting and undermining of democratically legislated liability norms is taking place to allow entry of US nuclear corporations in India. According to the reports, the US has been unhappy that it has still not got its share of the Indian nuclear market despite engineering changes in the international regimes like the Nuclear Suppliers Group (NSG) to allow nuclear supplies to India. When the US sought to change the original deal and denied enrichment and reprocessing technologies to India, it was seen as a way to pressure the country to change its liability law.[34]

## Livelihoods and safety at stake

The communities in and around the village of Kovvada – primarily low-income farmers and fisherfolk – see the nuclear project as a threat to their environment, health, livelihood and traditional lifestyle. This project is an all-round disaster-in-the-making, as it threatens to destroy the fragile ecology of India's eastern coast, and endanger the safety of people in densely populated areas. It will disenfranchise thousands of people in local communities by depriving them of their livelihoods and sustainable lifestyles.

Most of the required land for the Kovvada project has already been acquired by using carrot-and-stick tactics. No Environmental Impact Assessment (EIA) has been conducted even after 10 years of the announcement of the Kovvada project. Situated in Srikakulam District on the shores of Bay of Bengal, this project would endanger the precious bio-diversity of the region and the surrounding environment.

Local communities have been protesting intensely against forcible land acquisition for this project.[35] They have repeatedly said that it is not just a matter or better compensation – they do not want any nuclear plant at all. India's past record in rehabilitating the communities displaced by various big projects – dams, mines, thermal power projects etc. – has been extremely poor and after the experience of the Bhopal accident citizens can hardly rely on the authorities for an accountable response.

Andhra Pradesh is one of the most ecologically fragile states of India and arbitrarily allotting land for the nuclear plant – first for GE and then for Westinghouse – without an environmental clearance and a transparent site-selection process shows the complete disregard for local people's dignity and environmental concerns.[36] Andhra state government takes pride in having plans afoot for the entire nuclear fuel cycle – from mining to nuclear reactors and reprocessing, but has no stated plans for nuclear waste.[37] India has been in denial of waste problems and the last we heard from the concerned minister, he said India will have to think of nuclear waste after 30-40 years.[38] India is one of the very few countries that did not conduct independent safety audits and reviews after the 2012 Fukushima accident. It remains in complete denial as to the insurmountable risks that nuclear power poses.[39]

The project does not even make economic sense. The effective cost of electricity from the nuclear plant in Kovvada will be at least four times higher than the current market tariff in India.[40] The latest open bids for decentralized solar and wind power have been even cheaper than existing thermal power.[41]

## Deepening crisis of Westinghouse

The 2008 US-India nuclear deal helped open the way for nuclear companies like Westinghouse. It provides US assistance to India's civilian nuclear energy program, even though India is not a signatory to the Nuclear Non-Proliferation Treaty, a condition for such international deals. Westinghouse clearly sees India as easy pickings. The Indian government has finalized nuclear agreements as part of its geo-political strategy, without ever doing its homework on the environmental impacts, cost-benefit analysis, safety assessment or any democratic consultation on the energy future of the country. Furthermore, Indian authorities have clamped down on protesters by subjecting them to violence, trumped-up charges and accusations, and excluding them from public hearings by force.

Westinghouse has a lamentable track record in the US. One of its two projects – to build two AP1000 reactors in South Carolina – has already been abandoned, leaving ratepayers with a US$9 billion debt burden. The two plants were so massively over budget and behind schedule they were predicted to have cost at least

$26 billion if completed, nearly three times the original projected price of $9.8 billion. A second Westinghouse US project for two AP1000 reactors in Georgia is more than five years behind schedule. Costs there have at least doubled and are predicted to rise to more than $27 billion, double the initial estimate of $14 billion. It was re-evaluated late last year and given the continued green light, but it is ratepayers again who will bear the burden of the project's vast expense.

If Westinghouse is permitted to go forward with the Kovvada project, India can anticipate interminable delays, massive cost overruns and environmental contamination at best; a nuclear disaster at worst, if indeed the project ever gets completed, which is doubtful. What is more likely is that Kovvada's economy and ecology will have been ruined and time will have been wasted that would have been better used installing cheaper, cleaner and safer renewable energy instead.

*Individuals can sign a 'Westinghouse, Quit India!' petition at: www.dianuke.org/westinghouse-quit-india-statement-kovvada-nuclear-project-andhra-pradesh/*

*Organizations, please send your endorsement of the petition to Kumar Sundaram, editor@dianuke.org*

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# 2017 in review: Uranium is best left in the ground

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*NM857.4706*

*"It is a misunderstanding that uranium mining can cause radioactivity. It is not true because uranium gets radioactive only when it is enriched. Otherwise, uranium is just like any other soil as it has got no radiation. But there is a popular belief that if uranium is there, radiation will also be there."*

*– T.P. Sreenivasan, former Representative of India to the International Atomic Energy Agency.*

*The Shillong Times, September 2017.*[1]

The uranium market is a curious beast at the best of times – keen to spot a bargain, investors get more and more excited the further the uranium price and company stock prices fall. They've had plenty to get excited about in recent years. These days, the market exhibits multiple levels of weirdness, all stemming from the growing acknowledgment that nuclear power and the uranium industry face a bleak future.

The uranium market has a "subdued outlook" and Cameco's uranium is now "more valuable in the ground" according to Warwick Grigor from Far East Capital, because the cost of production is higher than the prices currently being offered.[2] Cameco CEO Tim Gitzel agrees, saying in January 2018 that at current prices "our supply is better left in the ground."[3] So uranium industry executives and market analysts are finally coming around to rallying cry of the anti-uranium movement: Leave it in the ground!

We've also had the odd situation over the past year of nuclear lobbyists arguing repeatedly that the nuclear power industry is in "crisis"[4] and wondering what if anything can be salvaged from "the ashes of today's dying industry".[5] Usually such claims come from the anti-nuclear movement – sometimes more in hope that expectation.

And we've had the odd situation of industry bodies (such as the US Nuclear Energy Institute) and supporters (such as former US energy secretary Ernest Moniz) openly acknowledging the connections between nuclear power and weapons – connections they have strenuously denied for decades.[6] Such arguments are now being used in an effort to secure preferential treatment for uranium mining companies in the US. In January 2018, Ur-Energy and Energy Fuels lodged a petition with the Department of Commerce under the Trade Expansion Act of 1962, the purpose of which is to protect national security industries that are under threat from imports.[7] The companies want a mandated requirement for US utilities purchase a minimum 25% of their requirements from US mines.


Lizards Revenge protest, Olympic Dam uranium mine, South Australia, 2012.

Ur-Energy and Energy Fuels argue that over-reliance on uranium from Russia, Kazakhstan, Uzbekistan and China "threaten national security". Domestic production accounts for less than 5% of national demand, they state, and a "healthy uranium mining industry is vital to U.S. national security, because it supplies fuel for nuclear power plants that are a key component of the nation's critical energy infrastructure and essential defense needs." Uranium is "the backbone of the U.S. nuclear deterrent and fuels ships and submarines in the U.S. Navy", the companies state.

The arguments mounted by Ur-Energy and Energy Fuels might appeal to President Trump and they would dovetail neatly with his silly conspiracy theory about Hillary Clinton threatening national security by allowing the sale of a uranium mining company with US interests to Russia's Rosatom.[8]

But the arguments are likely to collapse under the weight of their own stupidity. They don't appear to enjoy any support – none that we're aware of, at least – from the US nuclear weapons complex despite a requirement for uranium used in weapons programs to be domestically sourced. It makes no difference to the nuclear weapons complex whether 5% or 25% of uranium is domestically sourced.

According to market analysts FNArena, the petition lodged by Ur-Energy and Energy Fuels has "brought the uranium market to a screaming halt" and US power utilities have warned that such a quota would force the early shutdown of some nuclear plants.[9]

## Another miserable year for the uranium industry

Uranium mine production increased by 50% from 2007 to 2016.[10] The increase was driven, initially at least, by expectations of the nuclear renaissance that didn't eventuate. Mine production plus secondary sources[11] have consistently exceeded demand – 2017 was the eleventh consecutive year of surplus according to the CEO of uranium company Bannerman Resources.[12]

Stockpiles (inventories) have grown steadily over the past decade to reach enormous levels – more than 1.4 billion pounds U3O8 according to Ux Consulting[13] or 1.2 billion pounds according to the OECD's 2016 Red Book.[14] Thus

**Uranium Prices (US$ / pound uranium oxide)**

| | 1 June 2007 | 1 Dec. 2008 | 1 Feb. 2011 | 1 Dec. 2011 | 1 Dec. 2014 | 1 Dec. 2017 |
|---|---|---|---|---|---|---|
| **Spot price** | 136 | 52.50 | 69.63 | 51.88 | 35.50 | 22.32 |
| **Long-term contract price** | 95 | 70 | 71.50 | 62 | 49.50 | 30.67 |
| **Notes** | Peak bubble | | Pre-Fukushima | Decline 2011-16 | | Flat |

*Source: Cameco: www.cameco.com/invest/markets/uranium-price*

stockpiles alone would suffice to keep the entire global reactor fleet operating for around eight years. Supply from mines and secondary sources in recent years has exceeded demand by about 30 million pounds U3O8 per year or 18%.[13]

Those dynamics have put downward pressure on prices. Uranium prices were flat in 2017. The spot price as of 1 December 2017 was less than one-third of the pre-Fukushima price (and less than one-sixth of the 2007 peak-bubble price), and the long-term contract price less than half the pre-Fukushima price.[15]

Countless would-be uranium mining companies have given up. Some mines have closed, others have been put into care-and-maintenance, and others have reduced output. But mine production plus secondary sources have continued to exceed demand – and to exert downward pressure on prices.

Very few mines could operate at a profit at current prices (US$21.88 spot price and $30 long-term contract prices as of 31 January 2018).[15] Some mines are profitable because earlier contracts stipulated higher prices, while many mines are operating at a loss. Current prices would need to more than double to encourage new mines – a long-term contract price of about US$70–$80 is typically cited as being required to encourage the development of new mines.[16] Companies considering new mines also need to factor in competition from mines that have been producing at reduced output or put into care-and-maintenance.

Many companies have been loathe to close operating mines, or to put them into care-and-maintenance, even if the only other option is operating at a loss. They have been playing chicken, hoping that other companies and mines will fold first and that the resultant loss of production will drive up prices.[17] "We have to recognise that we over-produce, and we are responsible for this fall in the price," said Areva executive Jacques Peythieu in April 2017.[18]

The patterns outlined above were repeated in 2017. It was another miserable year for the uranium industry. A great year for those of us living in uranium producing countries who don't want to see new mines open and who look forward to the closure of existing mines. And a great year for the nuclear power industry – in the narrow sense that the plentiful availability of cheap uranium allows the industry to focus on other problems.

## Cut-backs announced by Cameco and Kazatomprom

The patterns that have prevailed over the past five years or so might be changed by decisions taken by Cameco (Canada) and Kazatomprom (Kazakhstan) in late 2017 to significantly reduce production. Previous cut-backs in Canada and Kazakhstan have had little or no effect, and so far the late-2017 announcements have only resulted in a small, short-lived upswing in uranium prices. But the cut-backs are significant and their impact might yet be felt.

As a result of the decisions by Cameco and Kazatomprom (detailed in the following article), global production in 2018 will probably be reduced by 10–15%.[3,19,20] After years of oversupply (including secondary sources), production and demand will be more-or-less equivalent in 2018.

A late-2017 report by Cantor Fitzgerald equity research argued that the decisions by Cameco and Kazatomprom could result in a "step change" for uranium prices.[19] Rob Chang from Cantor Fitzgerald said he believes that a "violent" increase in the price of uranium is coming.[3]

But Chang's analysis was more circumspect than his choice of adjectives: "We expect these events to ultimately push spot uranium prices to the mid-high US$20/lb range and perhaps into US$30/lb. However, as seen so far, the degree of movement may be muted at first due to fact that there are a limited number of qualified purchasers of uranium – making it a less efficient market. Inventory levels are also a concern as we estimate that there are 800-1,200M lbs of total above ground inventory of which about 700-800M lbs are held by utilities. We do not believe that all of it is available for sale as significant portions are held for strategic purposes and necessary utility needs. Moreover there is the possibility of sales from distressed utilities and by utilities with reactors that are being decommissioned."[19]

TEPCO – operator of the Fukushima plant in Japan – is perhaps the most distressed of all utilities and is currently locked in a legal dispute with Cameco after declaring *force majeure* and breaking its uranium purchase agreement.[21] Cameco is seeking US$681.9 million in damages from TEPCO.[21]

Warwick Grigor from Far East Capital was downbeat about Cameco's announcement. "I don't see this as a turnaround for the uranium price; at best they will stay where they are, but it doesn't signal a boom in price," he said in November 2017.[2]

BHP marketing vice-president Vicky Binns said in December 2017 that uranium markets would remain oversupplied for close to a decade, with "downward pressure" remaining on uranium prices despite Cameco's production cuts. She said that demand for uranium could outstrip supply by the late 2020s as consumption rises

but that could change if developed nations close their nuclear reactors earlier than expected, or if renewables take a larger than expected market share.[20] BHP owns the Olympic Dam (Roxby Downs) mine in South Australia, easily the world's biggest uranium deposit.

Equally downbeat comments have been made by other industry insiders and analysts in recent years. Former Paladin Energy chief executive John Borshoff said in 2013 that the uranium industry "is definitely in crisis" and "is showing all the symptoms of a mid-term paralysis".[22] Former World Nuclear Association executive Steve Kidd in May 2014 predicted "a long period of relatively low prices".[23] Nick Carter from Ux Consulting said in April 2016 that he did not see a supply deficit in the market until "the late 2020s".[24]

Perhaps a price increase is on the way due to some combination of production cut-backs, the nuclear power micro-renaissance (discussed in the last issue of *Nuclear Monitor*[25]), and long-term contracts needing to be renegotiated. But in all likelihood, any uptick won't be soon and it won't be violent (or if the bubble that peaked in 2007 is a guide, a violent upswing will be followed by a violent downswing).

Moreover the market is imperfect and increasingly fragmented. Arguments advanced by Steve Kidd in 2014 still hold.[23] He argued that "the case made by the uranium bulls is in reality full of holes" and that a new era is emerging with the uranium market split into three:

- The Chinese will favor investing directly in mines to satisfy their requirements; they are not going to 'play ball' with the established uranium market.
- The Russians will continue to be significant nuclear fuel exporters but their own market will remain essentially closed to outsiders. They still have secondary supplies to tap into (plenty of surplus highly-enriched uranium remains to be down-blended) and they will follow the Chinese and invest directly in uranium assets if their own domestic production remains constrained.
- The established uranium producers will have the remainder of the market to satisfy and that will likely be declining in magnitude.

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# Cameco and Kazatomprom: World's biggest uranium producers announce cut-backs

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*NM857.4707*

Slowly but surely, uranium market soothsayers are waking up to the fact that nuclear power and the uranium industry face a bleak future. Writing in *Motley Fool* last December, Maxx Chatsko wrote:[1]

*"I've done a complete 180 on nuclear energy in the last year. ... The enormous headwinds facing the global nuclear power industry represent a significant long-term obstacle for Cameco shareholders. The threat of reactor shutdowns, even spread out over the next two decades, creates a cloud of uncertainty that will continue to hang over uranium prices. Although they could rebound from their current historic lows, there doesn't seem to be any catalyst on the horizon for sustained demand growth. Simply put, nuclear power is on its way out, with new construction likely to be significantly offset by retirements. That's bad news for uranium miners everywhere."*

Cameco is responsible for about 17% of global uranium production, or at least that was the figure before the late-2017 announcement to reduce production. The company has been downsizing in recent years:

- In December 2012, Cameco booked a C$168 million (US$133m) write-down on the value of its Kintyre uranium deposit in Western Australia.[2]
- In 2014, Cameco cut its growth plans and uranium exploration expenses, warning that the "stagnant, over supplied short-term market" was not going to improve any time soon.[3]
- In 2014, Cameco put its Millennium uranium project in northern Saskatchewan on hold – where it remains today – and asked the Canadian Nuclear Safety Commission to cease the mine approval process.[4]
- In April 2016, Cameco announced that it was suspending uranium production at Rabbit Lake in Canada, reducing production at McArthur River / Key Lake in Canada, and slowing production at its two US uranium mines, both in-situ leach mines – Crow Butte in Nebraska and Smith Ranch-Highland in Wyoming. About 500 jobs were lost at Rabbit Lake, 85 at the US mines, and corporate headquarters was downsized.[5]
- In early 2017, Cameco announced that another 120 workers would be sacked by May 2017 at three Canadian uranium mines and mills – McArthur River, Key Lake and Cigar Lake – and production at McArthur River, already reduced, would be suspended for six weeks in mid-2017.[6,7]

And in late-2017, Cameco announced that production at McArthur River, the world's largest producing uranium mine, would be suspended from January 2018 for around 10 months. The Key Lake mill will also be put into care-and-maintenance.[8,9] Cameco is 70% owner of McArthur River and 83% owner of Key Lake; Areva (now called Orano) owns the remainder.

The workforce at McArthur River and Key Lake will be reduced by about 845 workers (including contractors), with about 210 workers retained to maintain the two sites in care-and-maintenance.[9]

A Cameco statement said:[9]

*"Cameco plans to meet its commitments to customers from inventory and other supply sources during the suspension, which will be reviewed on an ongoing basis until inventory is sufficiently drawn down or market conditions improve. The duration of the suspension and temporary layoff is expected to last 10 months.*

*"Uranium prices have fallen by more than 70% since the Fukushima accident in March 2011 and remain at unsustainably low levels. Cameco has been partially sheltered from the full impact of weak prices by its portfolio of long-term contracts, but those contracts are running out and it is necessary to position the company today to generate cash flow if prices do not improve. ...*

*"We have reduced supply, avoided selling into a weak spot market, resisted locking-in long-term sales commitments at low prices, and significantly reduced costs. To decrease costs, we suspended production at the Rabbit Lake operation, stopped development and curtailed production at our US operations, reduced workforce across all our sites including head office, changed air commuter services for operations in Saskatchewan, changed shift schedules at two Saskatchewan sites, and downsized corporate office functions including a consolidation of our global marketing activities."*

The "other supply sources" mentioned above including buying uranium on the spot market – Cameco's uranium is more valuable left in the ground at current prices.

Cameco CEO Tim Gitzel said in November that further cutting production is an option despite the repeated cut-backs in recent years and the suspension of production at McArthur River and Key Lake.[10]

Gitzel said last year that "obviously we're very far from requiring any new greenfield uranium projects."[11]

From being the top uranium stock in 2016, Cameco made a complete turn-around to become the worst-performing uranium stock in 2017, shedding 12% during the year.[12]

The *Northern Miner* reported in November 2017 on Cameco's latest cut-backs – and the uranium industry's broader malaise:[13]

*"The bottom line is that Cameco is suspending 40–45% of its mine output and laying off 20% of its workforce. Cameco is also slashing its annual dividend by 80% next year from 40¢ to 8¢ per common share ...*

*"In the post-Fukushima years, Cameco had always reassured stakeholders it was sheltered from the impact of weak uranium prices by its portfolio of long-term contracts, but the company now admits 'those contracts are running out, and it is necessary to position the company today to generate cash flow if prices do not improve.*

*"Cameco emphasizes that company-wide, it has already lowered supply, cut planned capital expenses, avoided selling into a weak spot market, resisted locking in long-term sale commitments at low prices and significantly reduced costs.*

*"Across mining, no one has had a harder past seven years than uranium miners, developers and explorers, and the year ahead shows little sign of improvement. If the subsector's leader Cameco is having these kinds of grave troubles, we can only imagine what the rest of the uranium pack is going through in closed-door meetings."*

## Kazatomprom

In January 2017, Kazatomprom announced that it planned to cut production by 10% in 2017 in response to ongoing oversupply in the uranium market.[14]

In December 2017, Kazatomprom announced a 20% reduction of uranium production from 2018–2020. That reduction equates to about 7.5% of estimated global production for 2018 (Kazakhstan has accounted for about 39% of world production in recent years).[8,14-16]

McArthur River uranium mine in mid-winter.
*Source: www.organizingrocks.org*

"Given the challenging market conditions, and in light of continued oversupply in the uranium market, we have taken the strategic decision to reduce production in order to better align our production levels with market demand," Kazatomprom chairperson Galymzhan Pirmatov said.[16]

China has been a major buyer of uranium from Kazakhstan. That supply may be slowing as the Chinese nuclear power program slows, and China may have stockpiled as much uranium as it plans to.[17] Former World Nuclear Association executive Steve Kidd estimates that China has accumulated at least 100,000 tonnes of uranium[17] – about 12 times its estimated 2017 requirements.[18] China's stockpile may be higher – Ux Consulting estimated it at about 300 million pounds U3O8 (115 tonnes of uranium) in mid-2016.[19]


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# Small Modular Reactors for Nuclear Power: Hope or Mirage?

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*NM857.4708*

In October 2017, just after Puerto Rico was battered by Hurricane Maria, US Secretary of Energy Rick Perry asked the audience at a conference on clean energy in Washington, D.C.: "Wouldn't it make abundant good sense if we had small modular reactors that literally you could put in the back of a C-17, transport to an area like Puerto Rico, push it out the back end, crank it up and plug it in? ... It could serve hundreds of thousands".[1]

As exemplified by Secretary Perry's remarks, small modular reactors (SMRs) have been suggested as a way to supply electricity for communities that inhabit islands or in other remote locations.

More generally, many nuclear advocates have suggested that SMRs can deal with all the problems confronting nuclear power, including unfavorable economics, risk of severe accidents, disposing of radioactive waste and the linkage with weapons proliferation. Of these, the key problem responsible for the present status of nuclear energy has been its inability to compete economically with other sources of electricity. As a result, the share of global electricity generated by nuclear power has dropped from 17.5% in 1996 to 10.5% in 2016 and is expected to continue falling.

The inability of nuclear power to compete economically results from two related problems. The first problem is that building a nuclear reactor requires high levels of capital, well beyond the financial capacity of a typical electricity utility, or a small country. This is less difficult for state-owned entities in large countries like China and India, but it does limit how much nuclear power even they can install.

The second problem is that, largely because of high construction costs, nuclear energy is expensive. Electricity from fossil fuels, such as coal and natural gas, has been cheaper historically – especially when costs of natural gas have been low, and no price is imposed on carbon. But, in the past decade, wind and solar energy, which do not emit carbon dioxide either, have become significantly cheaper than nuclear power. As a result, installed renewables have grown tremendously, in drastic contrast to nuclear energy.[2]

How are SMRs supposed to change this picture? As the name suggests, SMRs produce smaller amounts of electricity compared to currently common nuclear power reactors. A smaller reactor is expected to cost less to build. This allows, in principle, smaller private utilities and countries with smaller GDPs to invest in nuclear power. While this may help deal with the first problem, it actually worsens the second problem because small reactors lose out on economies of scale. Larger reactors are cheaper on a per megawatt basis because their material and work requirements do not scale linearly with generation capacity.

SMR proponents argue that they can make up for the lost economies of scale by savings through mass manufacture in factories and resultant learning. But, to achieve such savings, these reactors have to be manufactured by the thousands, even under very optimistic assumptions about rates of learning.[3] Rates of learning in nuclear power plant manufacturing have been extremely low; indeed, in both the United States and France, the two countries with the highest number of nuclear plants, costs rose with construction experience.

For high learning rates to be achieved, there must be a standardized reactor built in large quantities. Currently dozens of SMR designs are at various stages of development; it is very unlikely that one, or even a few designs, will be chosen by different countries and private entities, discarding the vast majority of designs that are currently being invested in. All of these unlikely occurrences must materialize if small reactors are to become competitive with large nuclear power plants, which are themselves not competitive.

There is a further hurdle to be overcome before these large numbers of SMRs can be built. For a company to invest in a factory to manufacture reactors, it would have to be confident that there is a market for them. This has not been the case and hence no company has invested large sums of its own money to commercialize SMRs. An example is the Westinghouse Electric Company, which worked on two SMR designs, and tried to get funding from the US Department of Energy (DOE). When it failed in that effort, Westinghouse stopped working on SMRs and decided to focus its efforts on marketing the AP1000 reactor and the decommissioning business. Explaining this decision, Danny Roderick, then president and CEO of Westinghouse, announced: "The problem I have with SMRs is not the technology, it's not the deployment – it's that there's no customers. ... The worst thing to do is get ahead of the market".[4]

Given this state of affairs, it should not be surprising that no SMR has been commercialized. Timelines have been routinely set back. In 2001, for example, a DOE report on prevalent SMR designs concluded that "the most technically mature small modular reactor (SMR) designs and concepts have the potential to be economical and could be made available for deployment before the end of the decade provided that certain technical and licensing issues are addressed". Nothing of that sort happened; there is no SMR design available for deployment in the United States so far.

Similar delays have been experienced in other countries too. In Russia, the first SMR that is expected to be deployed is the KLT-40S, which is based on the design of reactors used in the small fleet of nuclear-powered

icebreakers that Russia has operated for decades. This programme, too, has been delayed by more than a decade and the estimated costs have ballooned.[2]

South Korea even licensed an SMR for construction in 2012 but no utility has been interested in constructing one, most likely because of the realization that the reactor is too expensive on a per-unit generating-capacity basis. Even the World Nuclear Association stated: "KAERI planned to build a 90 MWe demonstration plant to operate from 2017, *but this is not practical or economic in South Korea*" (my emphasis).

Likewise, China is building one twin-reactor high-temperature demonstration SMR and some SMR feasibility studies are underway[5], but plans for 18 additional SMRs have been "dropped" according to the World Nuclear Association, in part because the estimated cost of generating electricity is significantly higher than the generation cost at standard-sized light-water reactors.[6]

On the demand side, many developing countries claim to be interested in SMRs but few seem to be willing to invest in the construction of one. Although many agreements and memoranda of understanding have been signed, there are still no plans for actual construction. Good examples are the cases of Jordan, Ghana and Indonesia, all of which have been touted as promising markets for SMRs, but none of which are buying one.

Another potential market that is often proffered as a reason for developing SMRs is small and remote communities. There again, the problem is one of numbers. There are simply not enough remote communities, with adequate purchasing capacity, to be able to make it financially viable to manufacture SMRs by the thousands so as to make them competitive with large reactors, let alone other sources of power. Neither nuclear reactor companies, nor any governments that back nuclear power, are willing to spend the hundreds of millions, if not a few billions, of dollars to set up SMRs just so that these small and remote communities will have nuclear electricity.

Meanwhile, other sources of electricity supply, in particular combinations of renewables and storage technologies such as batteries, are fast becoming cheaper. It is likely that they will become cheap enough to produce reliable and affordable electricity, even for these remote and small communities – never mind larger, grid-connected areas – well before SMRs are deployable, let alone economically competitive.

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# The nuclear policy of the new German coalition agreement

On February 7, Angela Merkel and SPD chair Martin Schulz agreed to form a new government and a coalition agreement. However, the members of the SPD still have to approve the new government in a membership referendum.

From an anti-nuclear point of view, the coalition agreement is essentially a disappointment. There is no clear commitment to shut down the nuclear power plants faster than previously regulated. Germany could switch off the nuclear risk faster. And already today the nuclear power plants stand in the way of the expansion of renewable energies. Without accelerating the phase-out, only the nuclear power plant Philippsburg 2 will be shut down in 2019 under the new government.

Unfortunately, the SPD could not prevail with the clear demand to shut down the uranium enrichment plant in Gronau and the fuel element factory in Lingen by law. And this despite two legal opinions for the Ministry of the Environment in 2017 that declared the decommissioning of the facilities to be admissible. There is now only the vague requirement to prevent fuel deliveries to nuclear plants that are unsafe from a German point of view (i.e. Tihange).

Good is the agreement to revise the target of the EURATOM treaty and to reject any EU funding of new nuclear power plants. What this means in practice remains to be seen.

Completely ignored in the coalition agreement are the current security problems of interim storage facilities for highly radioactive waste and the challenges of a required longer interim storage than previously provided and approved.

The selection process for a new nuclear waste repository for high-level radioactive waste will continue under the new government. The (unrealistic) goal of having selected the location for the repository by 2031 is affirmed.

The announcement of a new "provisioning-storage facility" for the repository project Schacht-Konrad shows the failure of the previous concept for low and medium level radioactive waste in Germany.

– Thorben Becker / BUND (Friends of the Earth Germany)

# Bellona report on Ukraine's nuclear industry

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*NM857.4709*

It won't come as a surprise that safety would be a critical challenge still facing the nuclear industry in Ukraine, which inherited the infamous Chernobyl plant when the Soviet Union collapsed. Nearly as surprising has been the comparative lack of concise information on a national industry that supplies more than half of its country's electricity in conditions of political and economic turmoil.

With this in mind, Bellona has published its report, *The Ukrainian Nuclear Industry: An Expert Review*. The report is a collective effort by experts and academics on the inside of the country's ailing industry, and Bellona hopes it will serve as a guidepost to international non-profits and policymakers who aim to assure the industry's safety and eventual decommissioning while Ukraine makes its arduous transition to cleaner energy sources.

There's much to be done.

Many of the problems surrounding Ukraine's nuclear industry are ones of youth. It didn't really exist before Kiev declared its independence from Moscow in 1991, but when it did, it put itself in charge of some of Europe's most elderly reactors, as well as nuclear power's original sin: Chernobyl's number 4 reactor, which exploded in 1986.

And while the bulk of international attention and funding for Ukraine has been focused on bringing that disaster and its lingering aftereffects to heel – efforts that spurred engineering achievements like Chernobyl's New Safe Confinement – Ukraine's 15 other Soviet-built reactors have begun to hobble unsteadily toward retirement.

At the same time, these reactors, running at four separate nuclear power plants, supply 52 percent of the country's electricity. It's unlikely that Kiev will find the political will, let alone the funding, to retire any of these reactors anytime soon. This means most if not all of them will likely receive extensions of several years' time on their engineered life expectancies, and continue to add to a supply of radioactive waste that is the second biggest in Europe for decades longer.

In 2018, this problem will only get more burdensome when Russia, as per a long-standing agreement, returns to Ukraine the spent nuclear fuel and radioactive waste it has been accepting and reprocessing since the Soviet Union's dissolution.

The problem of Ukraine's overabundant radioactive waste would seem less critical if the country were taking steps to build a long-term repository, such as finding a suitable location for one – or indeed even had plans to do so. But as our report reveals, the bureaucracies in Kiev that are responsible for this are inefficient if not, in some instance, entirely lacking, and in any case have little in the way of public faith in their competent operation.

Prospects are slightly brighter when it comes to dealing with spent fuel from Ukraine's nuclear reactors. Officials know how much there is and are wise to the fact that they have to build a centralized facility to store it. But as is the case in other parts of the industry, Kiev has little hope of building it without significant funding from other countries.

Overseeing all of Ukraine's nuclear reactors and the waste and spent fuel they produce is a national nuclear regulator whose basic structure is, like the industry itself, a hand-me-down from Moscow, and it lacks independence from the structures it is supposed to be regulating. And even this imperfect arrangement is suffering financially. As our report reveals, even the computers the regulator uses are donated from abroad.

Those among the Ukrainian public who could raise awareness about these issues face dismal prospects as well. What few environmental organizations there are tend to be poorly funded and lack the expertise they need to engage effectively with policymakers within government.

Finding ways to manage its nuclear inheritance from Russia is, in crucial ways, also a question of Ukraine's ongoing political independence. It is, after all, Russian fuel that runs Soviet reactors. Kiev has started buying more specially fabricated nuclear fuel from western corporations, but further untying the country's tangled nuclear knot will require other forms of international engagement.

Kiev seems to be grasping the rudiments of that, and dozens of countries from Europe to China are investing in a solar farm, which, emblematically, is set to open within the irradiated wastes of the Chernobyl exclusion zone this year.

Yet there is much more rubble to build on. With our new report, we hope to provide safer foundations so Kiev can build a safer energy future less dependent on its Soviet nuclear past.

The report is online in English and Ukrainian:

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*Reprinted from Bellona, 24 Jan 2018, http://bellona.org/news/nuclear-issues/2018-01-bellona-publishes-groundbreaking-report-on-the-state-of-ukraines-nuclear-industry*

# Nuclear battles in Australia

*NM857.4710*

### The fight isn't over to stop the Cameco's Yeelirrie uranium project in WA

Conservation groups and Tjiwarl Traditional Owners in Western Australia have vowed to continue the fight against uranium mining at Yeelirrie in the Northern Goldfields, despite the news on February 8 that their Supreme Court action to halt the mine had been unsuccessful.

If and when market conditions improve, Canadian mining company Cameco plans to construct a 9 km open mine pit, requiring clearing of 2,421 hectares of native vegetation and generating 36 million tonnes of mine waste that would remain radioactive for thousands of years. The mine would also threaten the extinction of multiple species of unique underground fauna.

The Conservation Council of WA and members of the Tjiwarl Native Titles group sought judicial review of the WA Government's approval of the project, which went against the advice of the state Environmental Protection Agency to reject the proposal because of unacceptable risks of microfauna species extinction. The Minister for the Environment initially upheld the position of the EPA on appeal, yet turned around and took a position to the contrary in letting the mine proceed. The court case has put a hold on the Commonwealth approval for the project which has not been granted.

Vicky Abdullah, Tjiwarl Native Title holder, said: "This is a very disappointing and sad day for our people, our land, and our future. We have fought long and hard to protect Yeelirrie and stop the uranium project. But the fight is not over – this is only one part of our campaign, and we will not allow this decision to stop us now. It's a bad decision, but it's not the end decision."

Conservation Council director Piers Verstegen said: "The verdict demonstrates a fundamental deficiency in the state's environmental laws, which currently allow a Minister to sign off on the extinction of multiple species with the stroke of a pen. The way the law has been interpreted by the court shows the Minister can ignore the EPA's public assessment process, and instead consider secret information in making a decision with has irreversible impacts on the environment.

"Today we stand knowing that community efforts have been successful in preventing any uranium mines operating in WA, despite two terms of a pro-uranium Government. We will continue to work with Traditional Owners to keep WA nuclear free and I am confident that despite today's decision we will continue to be successful in that goal."

Yeelirrie was approved by the former conservative Liberal Party state government. After the March 2017 state election, the incoming Labor Party government said that previously-approved mines, including Yeelirrie, could proceed but no others would be permitted.

### Radioactive Exposure Tour I – South Australia

The South Australian Radioactive Exposure Tour is a journey through Australia's nuclear landscape. The radtours have exposed thousands of people to the realities of 'radioactive racism' and the environmental and social impacts of uranium mining, radioactive waste and nuclear bomb testing.

Run by Friends of the Earth, this year's radtour will take place from Friday 30th March to Sunday 8th April.

This year we will visit communities in Kimba and the Flinders Ranges in South Australia, who are fighting to stop radioactive waste dumps on their land.

We'll head for Arabunna country, watch the sunset over Lake Eyre and see the Mound Springs − oases which are fed by the underlying Great Artesian Basin and host unique flora and fauna. Sadly, some of the Mound Springs have been adversely affected or destroyed altogether by the massive water intake of the Olympic Dam mine. The Tour will visit BHP's Olympic Dam uranium mine at Roxby Downs, the largest uranium deposit in the world.

In Woomera, we'll hear first-hand accounts of the British nuclear bomb tests at Maralinga and Emu Field. We'll also stop by Nurrungar, the desert surveillance base that closed in 1999.

Participants get to experience consensus decision making, desert camping and vegetarian cooking in affinity groups while travelling to some of the most beautiful and ecologically significant environments in Australia. If you're interested in learning about the industry or anti-nuclear campaigning, the radtour is an essential start or refresher.

International guests are welcome (many have participated over the years). One of the features of this year's radtour will be the participation of a number of Nobel Peace Prize-winning campaigners from the International Campaign to Abolish Nuclear Weapons.

The costs are (leaving from Melbourne or Adelaide): concession A$600 − waged A$800 − solidarity A$1000.

If you would like to register your interest in taking part in the 2018 Radioactive Exposure Tour, please complete the form posted at www.melbournefoe.org.au/radtour2018

Information on past radtours is posted at www.nuclear.foe.org.au/radtour

Contact: radexposuretour@gmail.com / 0417 318 368

### Radioactive Exposure Tour II – Western Australia

The upcoming Western Australian Radioactive Exposure Tour will be a 12-day journey to visit four proposed uranium mines in WA – Mulga Rock, Yeelirrie, Wiluna and Kintyre.

Run by the Ban Uranium Mining Permanently (BUMP) collective, the WA radtour will take place from Friday 9th March to Wednesday 21st March, 2018.

We will visit communities in Kalgoorlie, Laverton, Leonora, Wiluna, Newman and Parnngurr who are all fighting against uranium mine proposals on their land.

We'll head for Wangkatha country, listen to the Sounds on the Saltlake by Tjuma Pulka Media Aboriginal Corporation, before heading towards Mulga Rock proposed uranium mine. At Yeelirrie, we'll hear from Tjiwarl Traditional Owners stories of their 40-year fight to stop the proposed uranium mine and their Supreme Court action.

We will stop at the gates of Toro Energy, proposed Lake Way uranium mine and hear from experienced campaigners. From Wiluna, we will join and hear from Martu Traditional Owners campaigning to stop uranium mining on their country. We will head through Karlamilyi to Kintyre.

Desert camping, camp fires and cooking in affinity groups are all a part of the tour, while travelling to some of the most beautiful and ecologically significant environments in Western Australia.

For information and to register your interest: www.walkingforcountry/radtour, 0401 909 332, marcus@footprintsforpeace.org

## Standing Strong I – South Australians defeat dump

*Standing Strong* is a new book (and e-book) celebrating the victory of South Australians in their 2015–17 campaign to stop an international high-level nuclear waste dump being built in the state. The book is online at www.tinyurl.com/no-sa-dump and www.nodumpalliance.org.au/

Published by the No Dump Alliance (NDA), *Standing Strong* covers the key issues championed by Aboriginal and civil society groups opposed to the plan including the lack of Traditional Owner consent, dubious economics, the risks to people and the environment and the impact on future generations.

"This book documents how our community said no to the threat of radioactive waste," said Yankunytjatjara woman and NDA spokesperson Karina Lester. "We know nuclear is not the answer for our lands and people, we have always said no. It is important that all politicians get the clear message that nuclear waste and nuclear risk is not wanted in SA."

'Making Waves' – The Japanese Peace Boat has been in Australia in January-February 2018, visiting Perth, Adelaide, Melbourne, Hobart and Sydney. Japanese visitors collaborated with the International Campaign to Abolish Nuclear Weapons and civil society groups for a series of public forums, performances, media opportunities and meetings. Pictured are Australian and Japanese *hibakusha* Sue Coleman-Haseldine and Tanaka Terumi. www.icanw.org/au/making-waves


South Australians are still battling a plan by the federal government to establish a national nuclear waste dump in the state (www.nuclear.foe.org.au/waste)

## Standing Strong II – Northern Territorians defeat Jabiluka uranium mine

Mirarr Traditional Owners in the Northern Territory and their many supporters are this year celebrating and commemorating the 20th anniversary of the mass movement that eventually defeated Energy Resources of Australia's plan to mine the Jabiluka uranium deposit. Hundreds of thousands of Australians took to the streets, thousands made the long trek to the Jabiluka blockade (which lasted for eight months), and hundreds were arrested at the mine-site including Mirarr Senior Traditional Owner Yvonne Margarula.

The first of a number of initiatives to mark the 20th anniversary is a 'Standing Strong' calendar featuring powerful and beautiful images to commemorate the historic victory. It includes pictures from Mirarr country as well as from Jabiluka actions and support rallies across Australia and around the world.

*The Standing Strong calendar is online at http://bit.ly/2HcZtpo*
*To order hard copies: https://marrawuddi-gallery.squarespace.com/shop/2018-calendar-jabiluka-20-years*
*Contact: Kirsten@mirarr.net*

## Australian Nuclear Free Alliance

Last year, the Aboriginal-led Australian Nuclear Free Alliance (ANFA) celebrated its 20th birthday. ANFA has fought countless nuclear battle over the past two decades, many of them successfully.

Photos of ANFA's 20th anniversary meeting are online (www.anfa.org.au/anfa-2017-national-meeting/) and a book about ANFA's history can be ordered from jim.green@foe.org.au

## Australian Map

*australianmap.net* is an online resource – along with an A2 poster – documenting Australia's nuclear history and current struggles. Click on a site to read about it and to view pictures and videos. The website covers uranium mines, waste dumps, atomic bomb test sites, US military and spy bases, etc.

*www.australianmap.net*