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AND THE NUCLEAR INFORMATION &RESOURCE SERVICE (NIRS)

Dear readers of the WISE/NIRS Nuclear Monitor,

In this issue of the Monitor:

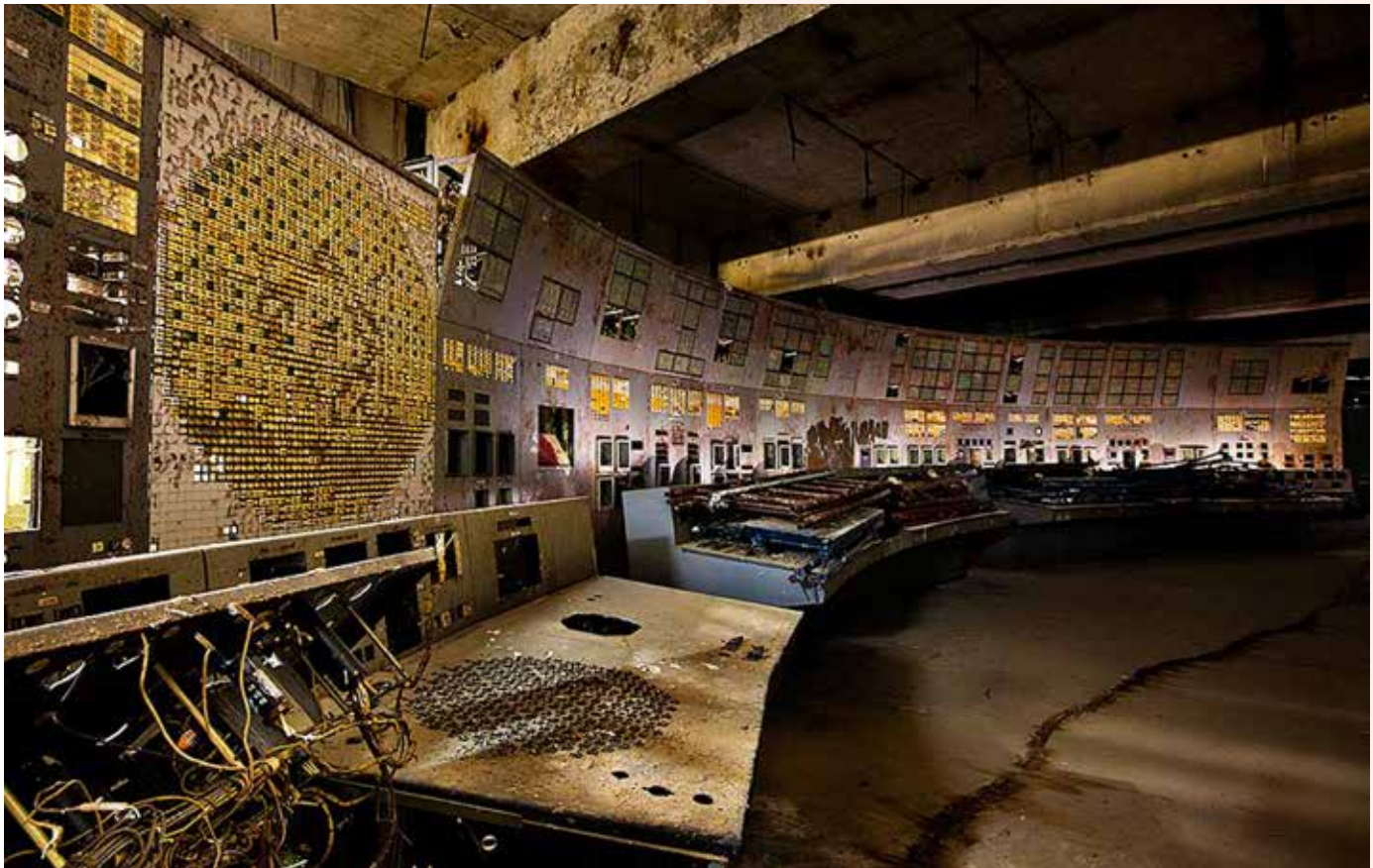
- Diet Simon writes about the German environment minister's refusal to halt nuclear fuel shipments to high-risk reactors in neighboring Belgium.
- We summarize an important critique of (terrestrial) fusion power by experienced fusion scientist Dr Daniel Jassby, who argues that it is not the ideal energy source extolled by its boosters but is "something to be shunned."
- We summarize new reports on the record-breaking growth of renewable energy sources in 2016 and a significant shift away from coal power.
- We write about Canadian uranium company Cameco's continuous downsizing over the past five years, its legal battle with the Canadian tax office over profit-shifting allegations, and its battle against TEPCO's termination of a long-term supply contract.
- And we detail many of the accidents, incidents and scandals that Cameco has been involved in since 1981.

Feel free to contact us if you have feedback on this issue of the Monitor, or if there are topics you would like to see covered in future issues.

Regards from the editorial team.

Email: monitor@wiseinternational.org

Monitored this issue:



April 26 marks the 31st anniversary of the Chernobyl disaster. Operators in the control room of reactor #4 (pictured) committed a series of errors during a safety test, triggering a reactor meltdown that resulted in the world's largest nuclear accident to date. © *Gerd Ludwig/INSTITUTE www.gerdludwig.com*

German environment minister's dangerous schizophrenia on nuclear fuel exports

Author: *Diet Simon*

NM842.4638 The German environment minister says delivery of German nuclear fuel to damage-prone power stations in neighboring Belgium is legal and she can't stop it, although she would if she could. Barbara Hendricks, a centre-left Social Democrat in a coalition government headed by centre-right Chancellor Angela Merkel, cites a legal opinion she commissioned from administrative law professor Wolfgang Ewer.

Germany supplies fuel to reactors at Tihange, near the German–Belgian border, and Doel, 15 km north of the very busy port of Antwerp, whose metropolitan area houses around 1.2 million people.

The Tihange reactor pressure vessel has thousands of cracks and both power stations have had to be repeatedly switched off because of faults. (A reactor pressure vessel contains the nuclear reactor coolant, core shroud, and the reactor core.)

Seven reactors at the two locations delivered more than 37% of Belgium's electricity production in 2015, according to the International Atomic Energy Agency.

Tihange is 65 km across the border from the German city of Aachen, where 240,000 people live. Germany, Belgium and The Netherlands abut in a nearby corner.

Wolfgang Ewer states in his appraisal "that it does not have to be ensured that the exported nuclear fuels are used according to the stipulations of the German Atomic Energy Act at the destination of the export. This requirement applies only to imports" to Germany.

The Greens in the federal parliament, citing a legal opinion they commissioned from energy attorney Cornelia Ziehm, argue that the Act empowers the government to stop such exports if German interests are harmed.

The law stipulates that exportation must be licensed if nothing is known that gives rise to concerns about the reliability of the exporter, and it is assured that the nuclear fuels to be exported are not used in any way that breaches Germany's international obligations in the field of nuclear energy, or endangers its internal or external security.[1]

Importation must be licensed if nothing is known that gives rise to concern about the reliability of the importer, and it is assured that the nuclear fuels to be imported are used under observance of the provisions of this law, the ordinances based on it and Germany's international obligations in the field of nuclear energy.

Citing the export rules, The Greens had demanded in a letter to Hendricks that she stop deliveries to Tihange immediately. "Almost monthly malfunctions and thousands of cracks in the reactor pressure vessel represent a danger to Germany," the Greens' parliamentary floorleader, Oliver Krischer, and their nuclear policy spokesperson Sylvia Kotting Uhl warned.

If radioactivity were to leak out, parts of the population would be hit by a worst possible accident, they said. "If Tihange 2 is not a danger to German safety, what is?" said Uhl.

The Greens failed with a parliamentary move to have fuel deliveries stopped. The co-governing Christian Democrats and Social Democrats voted them down.

Hendricks says she shares the safety concerns about the Belgian reactors and is now looking into the possibility of stopping uranium enrichment and fuel element production in Germany. But even if that were possible, it wouldn't stop operation of the Belgian power stations, which could obtain fuel elsewhere on the world market. Moreover, the ministry points out, a stop wouldn't be doable short-term.

A leading regional newspaper, Cologne's *Stadtanzeiger*, commented that Tihange is exemplary of the cross-border danger of nuclear power. If there was a serious incident in Tihange with a southwest wind blowing, Aachen would be hit worst. The *Stadtanzeiger* commentator quoted from a brochure published by local authorities giving tips for a serious nuclear malfunction "that would make your hair stand on end".

But at the end of the day, he wrote, Tihange also stands for the contrariness of politics and for minister Hendricks, who rates the reactor as a danger to German citizens but does not try to prevent its operation by stopping the delivery of German fuel rods. "No wonder thousands want to form a human chain and the local papers are getting masses of furious readers' letters," he wrote.

"If there were a serious reactor malfunction our region would have to cope with considerable effects," the crisis brochure states. No immediate damage would be expected, but in the long term, damage would include increased cancer incidence and deformities among newborns.

People should store enough food for 14 days and 28 litres of water per person. Windows should be sealed and one shouldn't leave the house. In case one had to, then only with a respiratory mask of the protective category FFP3. (A manufacturer of it states that it provides **"**protection from poisonous and deleterious kinds of dust, smoke, and aerosols. Oncogenic and radioactive substances or pathogens such as viruses, bacteria and fungal spores are filtered by this protective class of respirator masks.[2])

"It's clear that someone publishing such advice must be expecting the worst," the *Stadtanzeiger* newspaper continued. "Given that, the stance of the German environment minister is puzzling. Barbara Hendricks hails from North-Rhine Westphalia [the state in which Aachen lies], she knows Tihange. For the resolute Social Democrat criticising the breakdown-reactor is a kind of

point of honour. She has clearly expressed her concerns, even urging Brussels to switch off Reactor No 2."

The Federal Office for Nuclear Disposal Safety is answerable to Hendricks and licensed the direct delivery of German fuel rods. The last ones arrived on 4 March 2017.[3]

Local councillors in the border region feel left in the lurch by the federal government. "We represent almost 15 million people," says one of them. The closer German politicians and ordinary people are to the reactors, the greater the resistance and criticism and the less party differences matter. Worries and fear rule.

But the environment ministry in Berlin, 400 km away, cites the valid operating licence and the related contractual duty to deliver fuel rods. That might do for a law course at university, suggests the *Stadtanzeiger* commentator, on the theme of where does a political stance end and a politician's duty to service state agreements begin. "But it does nothing for credibility. It seems you've got to be a politician to understand the minister in her inconsistency, which borders on schizophrenia. How can she approve the delivery of fuel rods if in her own words that endangers German citizens?"

To stop delivery might have entailed contractual penalties and diplomatic strife, the commentary continued, but German politics would have stayed credible.

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US: nuclear-free contingent at People's Climate March on April 29

The Nuclear Information & Resource Service urges people to join us in DC or at a People's Climate March near you on Saturday April 29 – details are posted on the Nuclear-Free, Carbon-Free page on the People's Climate March website.

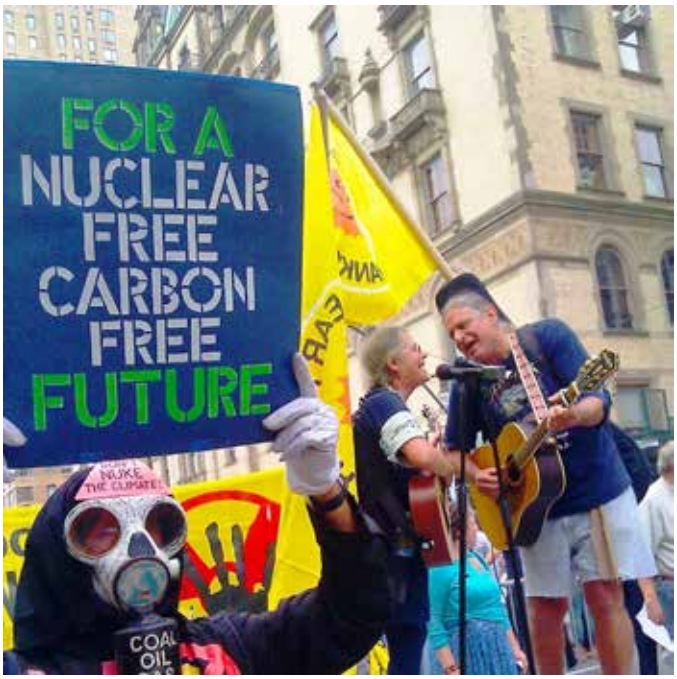
We march for a Nuclear-Free, Carbon-Free world to protect communities from the ravages of climate change; to end the threats of radioactive contamination and nuclear catastrophe; to demand environmental and climate justice; to promote a just and equitable transition to clean energy; to break the dominance of dirty energy corporations; and to build the sustainable, renewable, nuclear-free and carbon-free world we want and need.

Please invite your friends and spread the word on social media. You will find graphics and posts to share on our Facebook page, and signs, banners, and images you can print on our hub page.

Nuclear power in particular cannot solve the climate crisis. Indeed, its continued use exacerbates global warming by preventing the deployment of clean energy systems.

Among a myriad of other problems, nuclear power is:

- Too Dirty: nuclear reactors and the nuclear fuel chain produce vast amounts of lethal radioactive waste, which grow whenever nuclear power is used. The nuclear fuel chain is responsible for far more carbon emissions than renewable energy generation and improved energy efficiency.
- Too Dangerous: expanded use of nuclear power would inevitably lead to more Fukushimas and Chernobyls. The technology and materials needed to generate nuclear energy can be diverted to nuclear weapons programs.
- Too Expensive: nuclear power is the costliest means possible of reducing carbon and methane emissions; its use crowds out investment in clean energy sources.



- Too Slow: use of nuclear power to reduce fossil fuel emissions would require an unprecedented nuclear construction program, beyond the capability of the world's manufacturers within an acceptable time frame.
- Rooted in environmental injustice and human rights violations: First Nations, people of color and low-income communities are targeted for uranium mining and radioactive waste. Radiation harms women and girls at twice the rate as their male counterparts.

https://nuclearfreecarbonfree.peoplesclimate.org

https://www.facebook.com/groups/nukefreeclimatefreemarch/

Fusion scientist debunks fusion power

NM842.4639 The *Bulletin of the Atomic Scientists* has published a detailed critique of fusion power written by Dr Daniel Jassby, a former principal research physicist at the Princeton Plasma Physics Lab with 25 years experience working in areas of plasma physics and neutron production related to fusion energy.[1]

Here is a summary of his main arguments.

Jassby writes:

"[U]nlike what happens in solar fusion – which uses ordinary hydrogen – Earth-bound fusion reactors that burn neutron-rich isotopes have byproducts that are anything but harmless: Energetic neutron streams comprise 80 percent of the fusion energy output of deuterium-tritium reactions and 35 percent of deuterium-deuterium reactions.

"Now, an energy source consisting of 80 percent energetic neutron streams may be the perfect neutron source, but it's truly bizarre that it would ever be hailed as the ideal electrical energy source. In fact, these neutron streams lead directly to four regrettable problems with nuclear energy: radiation damage to structures; radioactive waste; the need for biological shielding; and the potential for the production of weapons-grade plutonium 239 – thus adding to the threat of nuclear weapons proliferation, not lessening it, as fusion proponents would have it.

"In addition, if fusion reactors are indeed feasible – as assumed here – they would share some of the other serious problems that plague fission reactors, including tritium release, daunting coolant demands, and high operating costs. There will also be additional drawbacks that are unique to fusion devices: the use of fuel (tritium) that is not found in nature and must be replenished by the reactor itself; and unavoidable on-site power drains that drastically reduce the electric power available for sale."

All of these problems are endemic to any type of magnetic confinement fusion or inertial confinement fusion reactor that is fueled with deuterium-tritium or deuterium alone. The deuterium-tritium reaction is favored by fusion developers. Jassby notes that tritium consumed in fusion can theoretically be fully regenerated in order to sustain the nuclear reactions, by using a lithium blanket, but full regeneration is not possible in practice for reasons explained in his article.

Jassby writes: "To make up for the inevitable shortfalls in recovering unburned tritium for use as fuel in a fusion reactor, fission reactors must continue to be used to produce sufficient supplies of tritium – a situation which implies a perpetual dependence on fission reactors, with all their safety and nuclear proliferation problems. Because external tritium production is enormously expensive, it is likely instead that only fusion reactors fueled solely with deuterium can ever be practical from the viewpoint of fuel supply. This circumstance aggravates the problem of nuclear proliferation ..."

Weapons proliferation

Fusion reactors could be used to produce plutonium-239 for weapons "simply by placing natural or depleted uranium oxide at any location where neutrons of any energy are flying about" in the reactor interior or appendages to the reaction vessel.

Tritium breeding is not required in systems based on deuterium-deuterium reactions, so all the fusion neutrons are available for any use including the production of plutonium-239 for weapons – hence Jassby's comment about deuterium-deuterium systems posing greater proliferation risks than deuterium-tritium systems. He writes: "In effect, the reactor transforms electrical input power into "free-agent" neutrons and tritium, so that a fusion reactor fueled with deuterium-only can be a singularly dangerous tool for nuclear proliferation."

Further, tritium itself is a proliferation risk – it is used to enhance the efficiency and yield of fission bombs and the fission stages of hydrogen bombs in a process known as "boosting", and tritium is also used in the external neutron initiators for such weapons. "A reactor fueled with deuterium-tritium or deuterium-only will have an inventory of many kilograms of tritium, providing opportunities for diversion for use in nuclear weapons," Jassby writes.

It isn't mentioned in Jassby's article, but fusion has already contributed to proliferation problems even though it has yet to generate a single Watt of useful electricity. According to Khidhir Hamza, a senior nuclear scientist involved in Iraq's weapons program in the 1980s: "Iraq took full advantage of the IAEA's recommendation in the mid 1980s to start a plasma physics program for "peaceful" fusion research. We thought that buying a plasma focus device ... would provide an excellent cover for buying and learning about fast electronics technology, which could be used to trigger atomic bombs."[2]

Other problems

Another problem is the "huge" **parasitic power consumption** of fusion systems – "they consume a good chunk of the very power that they produce ... on a scale unknown to any other source of electrical power." There are two classes of parasitic power drain – a host of essential auxiliary systems that must be maintained continuously even when the fusion plasma is dormant (of the order of 75–100 MW), and power needed to control the fusion plasma in magnetic confinement fusion systems or to ignite fuel capsules in pulsed inertial confinement fusion systems (at least 6% of the fusion power generated). Thus a 300 MWt / 120 MWe system barely supplies on-site needs and thus fusion reactors would need to be much larger to overcome this problem of parasitic power consumption.

The **neutron radiation damage** in the solid vessel wall of a fusion reactor is expected to be worse than in fission reactors because of the higher neutron energies, potentially putting the integrity of the reaction vessel in peril.

Fusion fuel assemblies will be transformed into tons of **radioactive waste** to be removed annually from each reactor. Structural components would need to be replaced periodically thus generating "huge masses of highly radioactive material that must eventually be transported offsite for burial", and non-structural components inside the reaction vessel and in the blanket will also become highly radioactive by neutron activation.

Molten lithium presents a **fire and explosion hazard**, introducing a drawback common to liquid-metal cooled fission reactors.

Tritium leakage is another problem. Jassby writes: "Corrosion in the heat exchange system, or a breach in the reactor vacuum ducts could result in the release of radioactive tritium into the atmosphere or local water resources. Tritium exchanges with hydrogen to produce tritiated water, which is biologically hazardous. Most fission reactors contain trivial amounts of tritium (less than 1 gram) compared with the kilograms in putative fusion reactors. But the release of even tiny amounts of radioactive tritium from fission reactors into groundwater causes public consternation. Thwarting tritium permeation through certain classes of solids remains an unsolved problem."

Water consumption is another problem. Jassby writes: "In addition, there are the problems of coolant demands and poor water efficiency. A fusion reactor is a thermal power plant that would place immense demands on water resources for the secondary cooling loop that generates steam as well as for removing heat from other reactor subsystems such as cryogenic refrigerators and pumps. ... In fact, a fusion reactor would have the lowest water efficiency of any type of thermal power plant, whether fossil or nuclear. With drought conditions intensifying in sundry regions of the world, many countries could not physically sustain large fusion reactors."

Due to all of the aforementioned problems, and others, "any fusion reactor will face outsized **operating costs**." Whereas fission reactors typically require around 500 employees, fusion reactors would require closer to 1,000 employees. Jassby states that it "is inconceivable that the total operating costs of a fusion reactor will be less than that of a fission reactor".

Jassby **concludes**:

"To sum up, fusion reactors face some unique problems: a lack of natural fuel supply (tritium), and large and irreducible electrical energy drains to offset. Because 80 percent of the energy in any reactor fueled by deuterium and tritium appears in the form of neutron streams, it is inescapable that such reactors share many of the drawbacks of fission reactors – including the production of large masses of radioactive waste and serious radiation damage to reactor components. ...

"If reactors can be made to operate using only deuterium fuel, then the tritium replenishment issue vanishes and neutron radiation damage is alleviated. But the other drawbacks remain—and reactors requiring only deuterium fueling will have greatly enhanced nuclear weapons proliferation potential."

"These impediments – together with colossal capital outlay and several additional disadvantages shared with fission reactors – will make fusion reactors more demanding to construct and operate, or reach economic practicality, than any other type of electrical energy generator.

"The harsh realities of fusion belie the claims of its proponents of "unlimited, clean, safe and cheap energy." Terrestrial fusion energy is not the ideal energy source extolled by its boosters, but to the contrary: It's something to be shunned."

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2016 another record year for renewables

NM842.4640 A new report by the International Renewable Energy Agency, *Renewable Energy Capacity Statistics 2017*, states that global renewable electricity generation capacity (including hydro) increased by 161 gigawatts (GW) in 2016, making it the strongest year ever for new capacity additions.[1]

Renewable electricity capacity grew by 8.7% in 2016, and renewables accounted for 60% of new capacity from all sources (55% if large hydro is excluded). Solar led the way with a record 71 GW of new capacity, along with 51 GW of wind, 30 GW of hydro, 9 GW of bioenergy (also a record), and just under 1 GW of geothermal energy capacity.

Global renewable electricity capacity has doubled over the past decade and now exceeds 2,000 GW:

YEAR	GLOBAL RENEWABLE ELECTRICITY CAPACITY (GW)	ANNUAL GROWTH (GW)
2007	989	
2008	1,058	69
2009	1,133	75
2010	1,223	90
2011	1,326	103
2012	1,444	118
2013	1,563	119
2014	1,690	127
2015	1,845	155
2016	2,006	161

That 2,006 GW capacity is 5.1 times greater than nuclear power capacity of 392 GW (including idle reactors in Japan).[2] Actual electricity generation from renewables (23.5% of global generation[3]) is more than double that from nuclear power (10.7%[4])

The renewable electricity capacity mix is as follows: hydro 58%, wind 22%, solar 13.9%, bioenergy 5.1%, geothermal and marine energy both <1%.

This year's edition of IRENA's *Renewable Energy Capacity Statistics* series also contains data for off-grid renewables. Off-grid renewable electricity capacity reached a modest 2.8 GW by the end of 2016, with solar contributing almost half of the total.

Investment falls: A separate report by the UN Environment Programme (UNEP) and Bloomberg New Energy Finance (BNEF) states that the strong growth of renewables occurred despite an 23% drop in investment (excluding large hydro).[5] A separate BNEF report finds that investment in 2016 – including all hydro – fell by 18%.[6]

The fall in investment last year was partly due to falling costs, with the average cost of solar photovoltaics and wind dropping by more than 10% compared to 2015.[7] Solar provides the most striking illustration: investment in 2016 was down 34% yet solar capacity growth was 34% higher than the previous year.[8]

Despite the drop, investment in renewables in 2016 was still roughly double that of fossil fuel generation.

Employment in the renewable energy sector (excluding large hydro) increased from 5.7 million in 2012 to 8.1 million in 2015 – an increase of 42%.[9]

Future Growth: IRENA Director-General Adnan Amin said in July 2016 that he believes the Agency's REMAP scenario – a doubling of renewable electricity energy by 2030 – is realistic.[10] IRENA's REMAP scenario is consistent with the projections of the International Energy Agency (IEA). The IEA's 2016 *Renewable Energy Medium-Term Market Report* predicts 825 GW of new renewable capacity from 2016–21, a 45% increase on the 2015 figure.[11] Growth of 161 GW in 2016 is consistent with that five-year projection. The IEA report notes that there is potential for more rapid growth than it projects, and identifies additional policy initiatives which would result in growth 29% higher than the projection of 825 GW.

Coal

A new report by Greenpeace, the Sierra Club and CoalSwarm notes that the amount of new coal power capacity starting construction fell by 62% in 2016 compared to the previous year.[12] In 2016, 65GW of new coal-fired units started construction, compared to 170GW in 2015.

In addition to the 62% drop in new coal plant construction starts, the report's findings also include a 48% decline in overall pre-construction activity, and an 85% decline in new Chinese coal plant permits.

Last year's coal decline was overwhelmingly due to China and India. In China, too much capacity has been built in recent years, and the move away from coal has also been driven by government policy to clean up air pollution. In India, the decline was due to slower-than-expected growth in energy demand, and rapid growth of renewables.

Paul Massara, the former CEO of RWE Npower and now head of a green energy company, North Star Solar, said: "The decline in new coal plants in Asian countries is truly dramatic, and shows how a perfect storm of factors are simply making coal a bad investment."[13]

A record-breaking 64 GW of coal capacity was shut down in the past two years, the report notes, mostly in the US and EU.

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Cameco battling uranium downturn, tax office, TEPCO

Author: *Jim Green – Nuclear Monitor editor*

NM842.4641 Where the nuclear power industry goes, the uranium industry follows. A decade ago, the hype about a nuclear power renaissance drove a uranium price bubble: the spot price in May 2007 was six times greater than the current price. The bubble collapsed, the nuclear power renaissance never materialized, and the uranium industry's prospects were further dimmed by the Fukushima disaster.

With the current nuclear power crisis jeopardizing the existence of industry giants like Toshiba and Westinghouse, the question arises: will the crisis create similar carnage in the uranium industry? Might it bring down a uranium industry giant like Cameco, which provides about 17% of the world's production from mines in Canada, the US and Kazakhstan?[1]

The short answer is that Cameco will likely survive, but the company has been downsizing continuously for the past five years. Other established uranium companies – such as Paladin Resources[2] and Energy Resources of Australia – may not survive, and an endless stream of uranium exploration companies have gone bust or diversified into such things as medicinal marijuana production[3] or property development.[4]

Cameco's downsizing began soon after the Fukushima disaster:

- In December 2012, Cameco booked a C$168 million (US$124m) write-down on the value of its Kintyre uranium deposit in Western Australia.[5]
- 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.[6]
- 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.[7]

Cameco announced in April 2016 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.[8]

Another 120 workers are to be sacked by May 2017 at three Canadian uranium mines – McArthur River, Key Lake and Cigar Lake – and production at McArthur River, already reduced, will be suspended for six weeks in mid-2017.[9,10]

"We regret the impact of these decisions on affected employees and other stakeholders," Cameco president and CEO Tim Gitzel said. "These are necessary actions to take in a uranium market that has remained weak and oversupplied for more than five years. While it is positive that we are starting to see other producers announce their intent to reduce supply, we have not yet seen an actual reduction in supply. Ultimately, it will be the return of both term demand and term contracting in a significant way that will signal that market fundamentals have turned more positive."[11]

Cameco's revenue dropped C$323 million (US$238m) in 2016 and the company posted a C$62 million (US$46m) loss for the year. The loss was largely the result of C$362 million (US$267m) in impairment charges, including C$124 million (US$91m) related to the Rabbit Lake mine and a write-off of the full C$238 million (US$176m) value of the Kintyre uranium project in Western Australia.[12]

"I think it's fair to say that no one, including me, by the way, expected the market would go this low and for this long," Gitzel said.[13] He said "market conditions in 2016 were as tough as I have seen them in 30 years."[14]

Cameco's 'tier-1' mines – McArthur River and Cigar Lake in Canada and the Inkai ISL mine in Kazakhstan – have been largely unaffected by the cutbacks except for the slowdown at McArthur River. But the tier-1 mines aren't safe, Cameco plans to reduce production by 7% in 2017, and new mines are off the table. Gitzel said: "In fact we're far from declaring that even tier-1 production is free from the pressure of further reductions. And obviously we're very far from requiring any new greenfield uranium projects."[14]

Cameco is considering selling its two US uranium mines – Crow Butte in Nebraska and Smith Ranch-Highland in Wyoming. Company spokesperson Gord Struthers said the company was at an "early stage" in the process and there was no target date for a decision. "Together, our US facilities have capacity to produce up to 7.5 million pounds a year and hold 93 million pounds of reserves and resources. In a different uranium market, it would be very attractive," he said.[15]

Analyst David Talbot said Cameco has probably been open to selling the US mines for some time.[16] The mines are potentially attractive, two US producers told *Reuters*, but liabilities related to reclaiming groundwater and future decommissioning of the mines may limit interest. Those costs might amount to C$257 million (US$190m), Cameco said.[16]

TEPCO cancels billion-dollar contract

Cameco faces a new problem with notorious Japanese company TEPCO announcing on January 24 that it had issued a contract termination notice, sparking a 15% drop in Cameco's share price over the next two days.[17,18,19] The termination affects about 9.3 million pounds of uranium oxide due to be delivered until 2028, worth approximately C$1.3bn (US$959m).

TEPCO argues that a "force majeure" event occurred because it has been unable to operate its nuclear plants

in Japan – four reactors at Fukushima Daini and seven reactors at Kashiwazaki Kariwa – for some years due to government regulations relating to reactor restarts in the aftermath of the March 2011 Fukushima disaster.

Cameco plans to fight the contract termination and will pursue "all its legal rights and remedies". Tim Gitzel said: "They've taken delivery under this contract in 2014, 2015 and 2016, so we're a bit perplexed as to why now all of a sudden they think there's a case of, as they say, 'force majeure.'"[17] TEPCO has received and paid for 2.2 million pounds of uranium oxide from Cameco since 2014.

Gitzel also noted that other Japanese utilities have successfully restarted their plants – three reactors are operating and seven have been approved to restart. "It is our opinion that TEPCO doesn't like the terms it committed to, particularly the price, and they want to escape the agreement," Gitzel said.[19]

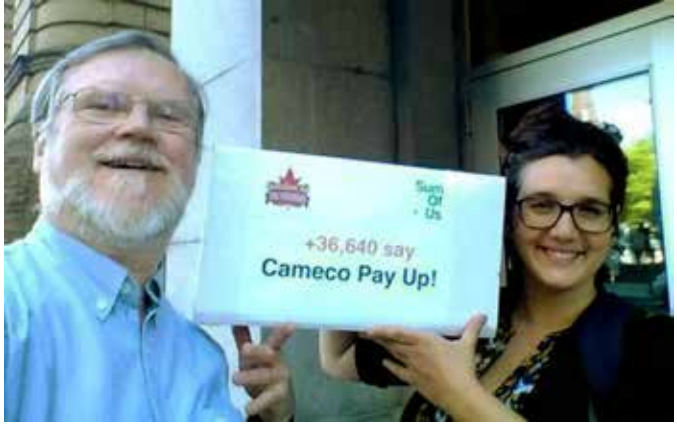
Financial analysts told *Reuters* that Cameco has a winning record in previous contract disputes with customers.[18] A negotiated settlement may be the outcome. Cameco reported cash receipts of C$46.7 million and C$12.3 million last year to allow two customers to cancel long-term uranium contracts.[18]

Japan is "swimming – some would say drowning – in uranium", the senior editor of *Platts Nuclear Publications* said in early 2016.[20] According to *Forbes* writer James Conca, Japan's existing uranium inventory will suffice to fuel the country's power reactors "for the next decade".[20]

Nick Carter from Ux Consulting said he believes TEPCO is the first Japanese utility to terminate a long-term contract, while many others have tried to renegotiate contracts to reduce volumes or prices or delay shipments. Gitzel acknowledged that "there is concern over the risk of contagion from the TEPCO announcement" – more customers might try to cancel contracts if TEPCO succeeds.[14]

Tax dispute

A long-running tax dispute is starting to heat up with the October 2016 commencement of a court case brought against Cameco by the Canada Revenue Agency (CRA). The dispute has been slowly winding its way through appeals and legal motions since 2009 when Cameco first challenged the CRA's findings. The court case is likely to conclude in the coming months but the court's decision may not be finalized until late-2017 or 2018.



Activists deliver a petition calling on Cameco to back-pay $2.2 billion in taxes.

Cameco is accused of setting up a subsidiary in Switzerland and selling it uranium at a low price to avoid tax.[21] Thus Cameco was paying the Swiss tax rate of about 10% compared to almost 30% in Canada.[22] Cameco set up the subsidiary in 1999 and established a 17-year deal selling uranium at approximately US$10 a pound, far less than the average price over the 17-years period.[23] Another subsidiary was established in Barbados – possibly to repatriate offshore profits.[22]

If Cameco loses the case in the Tax Court of Canada, it could be liable for back-taxes of C$2.2 billion (US$1.62bn).[23] Last year, the company spent approximately C$120 million (US$89m) on legal costs related to the tax dispute.[11]

Canadians for Tax Fairness[24] have been arguing the case for legislative change to stop profit-shifting schemes, and for Cameco to pay up. Last year, the NGO teamed up with Saskatchewan Citizens for Tax Fairness and the international corporate watchdog, SumOfUs, to deliver a petition with 35,000 signatures to the Prime Minister's office and to Cameco's executive offices.[25]

Don Kossick from Canadians for Tax Fairness said: "Cameco has a corporate responsibility to pay the $2.2 billion. They use Canadian-developed technology to dig Canadian uranium out of the Canadian ground and rely on the Canadian transportation system to bring their product to market. Cameco employs Canadian workers who developed their knowledge and skills in Canadian schools, rely on Canadian hospitals if / when they get sick and rely on the stability and legal protection that Canadian democracy provides. Canadians are exasperated with this shell game."[26]

Kossick noted that the C$2.2 billion could easily cover the budgetary deficit in Saskatchewan that has resulted in major cuts to health, education and human services.

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Cameco's uranium deposits in Western Australia

Kintyre (70% Cameco / 30% Mitsubishi)

The Martu Aboriginal people have fought against this proposed uranium mine since the 1980s. The deposit sits between two branches of a creek called Yantikutji which is connected to a complex network of surface and groundwater systems. It is also in an area that was cut out of the Karlamilyi National Park, WA's biggest National Park. Kintyre is home to 28 rare, endangered and threatened species. The project would include an open pit 1.5 km long, 1.5 km wide, it would use 3.5 million litres of water a day and leave behind 7.2 million tonnes of radioactive mine waste over the life of the project.

In June 2016, Martu Traditional Owners led a 140 km, week-long walk to protest against Cameco's proposed uranium mine at Kintyre. Aboriginal Traditional Owners are concerned the project will affect their water supplies as well as 28 threatened species in the Karlamilyi National Park.

Joining the protest walk was Anohni, the Academy Award-nominated musician from Antony and the Johnsons. She said: "It's a huge landscape – it's a really majestic place. It's really hard to put a finger on it but there's a sense of presence and integrity and patience, dignity and perseverance and intense intuitive wisdom that this particular community of people have. There is almost an unbroken connection to the land – they haven't been radically disrupted. They are very impressive people – it's humbling to be around these women. In many regards, I think the guys who run Cameco are desolate souls, desolate souls with no home, with no connection to land, with no connection to country."

www.ccwa.org.au/kintyre

Walkatjurra Walkabout against Cameco's Yeelirrie uranium mine, Wangkatja country, Western Australia, 2016. The next Walkatjurra Walkabout will begin in August 2017. *www.walkingforcountry.com*

Yeelirrie (100% Cameco)

Yeelirrie in the local Wongutha Aboriginal language means 'place of death'. The local community has fought against mining at Yeelirrie for over 40 years. There was a trial mine in the 1970s which was poorly managed: the site was abandoned, unfenced and unsigned with a shallow open pit and tailings left behind. The project would include a 9 km long, 1 km wide open pit, it would use 8.7 million litres of water a day and leave behind 36 million tonnes of radioactive mine waste over the life of the mine. There are many cultural heritage sites under threat from this proposal. The project was rejected by the Western Australian Environmental Protection Agency in 2016 because of the threat that 11 species of underground microfauna would become extinct. The WA Environment Minister ignored the EPA advice and approved the project anyway.

www.ccwa.org.au/yeelirrie

Cameco's incidents and accidents: 1981–2016

A more detailed, referenced version of this information,
written by Mara Bonacci and Jim Green for Friends of the Earth Australia, is posted at

https://wiseinternational.org/nuclear-monitor/842/nuclear-monitor-842-26-april-2017

or: http://tinyurl.com/cameco-2017

Date and Location	Description of Incident
1981−89: Saskatchewan, Canada	153 spills occurred at three uranium mines in Saskatchewan from 1981 to 1989. Cameco was fined C$10,000 for negligence in relation to a Nov. 1989 spill of two million litres of radium- and arsenic-contaminated water from the Rabbit Lake mine into Collins Creek, which flows into Wollaston Lake.
1990, May 13: Blind River Uranium Refinery	Leak shuts down the Canadian refinery. Approximately 178 kg of radioactive uranium dust leaked into the air over a 30-hour period. The filter system was bypassed accidentally.
1993: Canada/US	Inter-Church Uranium Committee from Saskatchewan reveals export of at least 500 tons of depleted uranium to the US military by Cameco, despite several Canadian treaties to export uranium only for "peaceful purposes".
1998: Kyrgyzstan	A truck en route to a Cameco gold main spills 2 tons of cyanide into the Barskoon River, a local drinking water and agricultural water source. 2,600 people treated and more than 1,000 hospitalized.
2001−onwards: Ontario	A 2003 report by the Sierra Club of Canada provides details of 20 major safety-related incidents and unresolved safety concerns at the Bruce nuclear power plant.
2002: Kyrgyzstan	Fatality at Cameco's Kumtor Gold Mine. Death of a Kyrgyz national, buried in the collapse of a 200 meter-high pit wall.
2003, April: McArthur River, Saskatchewan	Cave-in and flood of radioactive water at the McArthur River mine. Cameco knew about the danger of a cave-in for months if not years and how "miners worked without ventilation masks to save the mine and their jobs." A consultant's report found that Cameco had been repeatedly warned about the water hazards right up until the accident happened.
2004: Key Lake uranium mill, Canada	Canadian Nuclear Safety Commission approves Key Lake license renewal, despite continuing pit sidewall sloughing into the tailings disposed in the Deilmann pit. One million cubic meters of sand had already slumped into the tailings.
2004, April: Port Hope, Ontario	Gamma radiation discovered in a school playground during testing in advance of playground upgrades. Although the Canadian Nuclear Safety Commission and AECL tried to dismiss the findings, the material under the school had to be removed when it was converted to low-cost housing in 2011. The contaminated material came from the uranium processing facility in Port Hope, now owned by Cameco.
2006, April: Cigar Lake, Saskatchewan	A water inflow began at the bottom of the 6-meter wide shaft, 392 meters below the surface. All the workers left the area and removed equipment. According to a miner, "the mine's radiation alarm kept going off, but the radiation technician merely re-set the alarm, assuring us that everything was fine."
2006, Oct.: Cigar Lake, Saskatchewan	Cameco said its "deficient" development of the Cigar Lake mine contributed to a flood that delayed the mine project by three years and would double construction costs. Blasting by contract miners was performed with the wrong equipment and inadequate safeguards, allowing the mine to flood with groundwater on 22 Oct. 2006.

2007: Port Hope, Ontario	Substantial leakage of radioactive and chemical pollutants into the soil under the conversion facility – leakage not detected by monitoring wells. The plant was closed when contaminated soil was discovered, but during the clean-up it is likely that tailings found their way into the harbour.
2008: US/Canada	ISL mines owned by Cameco in Nebraska, Wyoming, and Canada have all had spills and leaks since beginning ISL uranium mining. Cameco made a settlement payment of $1.4 million to Wyoming for license violations, and $50,000 to Nebraska for license violations.
2008, January: Rabbit Lake mill	Seepage underneath the mill discovered after a contract worker noticed a pool of uranium-tainted ice at an outdoor worksite.
2008, May: Port Hope, Ontario	It was discovered during soil decontamination at the suspended Port Hope uranium processing facility that egress from degraded holding floors had contaminated the harbour surrounding the facility, which flows into Lake Ontario.
2008, June: Key Lake	Canadian Nuclear Safety Commission intends to approve the license renewal for Cameco's Key Lake mill although CNSC staff assigned 'C' ratings ("below requirements") in four out of 10 program areas assessed, including waste management, fire protection, environmental protection, and training. Pit wall sloughing in the Deilmann open-pit tailings facility remains unresolved.
2010: Rabbit Lake	Uranium discharges from Rabbit Lake (highest by far in Canada) showed increase rather than the predicted decrease in 2010. In 2010, the average monthly uranium discharge concentrations exceeded the Uranium Screening Objective during three months.
2011: Ship from Vancouver to China	A number of sea containers holding drums of uranium concentrate are damaged and loose uranium is found in the hold.
2012, August: Port Hope, Ontario	Spill of uranium dioxide powder resulted in one worker being exposed to uranium and three other workers potentially exposed during clean-up.
2012: Northern Saskatchewan	Draft agreement between Cameco, Areva and the Aboriginal community of Pinehouse includes extraordinary clauses such as this: "Pinehouse promises to: ... Not make statements or say things in public or to any government, business or agency that opposes Cameco/Areva's mining operations; Make reasonable efforts to ensure Pinehouse members do not say or do anything that interferes with or delays Cameco/Areva's mining, or do or say anything that is not consistent with Pinehouse's promises under the Collaboration Agreement."
2012, June 23: Blind River refinery, Ontario	Three workers exposed to airborne uranium dust after a worker loosened a ring clamp on a drum of uranium oxide, the lid blew off and about 26 kg of the material were ejected into the air.
2013–ongoing: Canada	Cameco is battling it out in tax court with the Canada Revenue Agency (CRA). Up to C$2.2 billion in corporate taxes allegedly went unpaid. Cameco set up a subsidiary in Switzerland allegedly for the sole purpose of avoiding taxes in Canada. 2016: Cameco also involved in tax dispute with the US IRS. According to Cameco, the IRS is seeking an additional $32 million in taxes, plus interest, and may also seek penalties.
2013: English River First Nation, Canada	English River First Nation sign deal with Cameco and Areva, agreeing to support Millennium uranium mine and drop a lawsuit over land near the proposed mine. Some English River First Nation band members reacted strongly to the agreement. Cheryl Maurice said. "I am speaking for a group of people who weren't aware that this agreement was being negotiated because there was no consultation process."

2013, June: Saskatchewan	Federation of Saskatchewan Indian Nations Chief Perry Bellegarde says the provincial government should not issue any new permits for potash, uranium or other resource development until First Nations concerns are addressed. Bellegarde said the province's lack of a revenue-sharing deal with First Nations stemmed from "economic racism." "Do not issue a licence to Cameco or Areva or BHP until indigenous issues are addressed," he said.
2013, August: Troy, Ohio, USA	A fire occurred on a truck carrying uranium hexafluoride which originated from Cameco's refinery in Port Hope, Ontario. Nuclear regulators in Canada – where the cargo originated – and in the US were not informed of the incident.
2013, Sept.: Northern Saskatchewan	Sierra Club Canada produces a detailed report on Cameco's uranium operations in Northern Saskatchewan. It details systemic corporate failure by Cameco as well as systemic regulatory failure. The report states: "This is a story about the failure to regulate despite the Canadian public interest and international commitments otherwise. ... There is no limit for uranium in groundwater. Despite limits where they exist, Cameco is allowed to wildly exceed them without consequence. ... At the McArthur River site, concentrations of arsenic, selenium, and uranium in water effluent have exceeded the standards by 54 percent for arsenic, 700 percent for selenium and an astronomical 1,230 percent for uranium. There is no reporting done on mercury. Blueberries and fish are contaminated with uranium."
2013, Dec.: Key Lake	License violations and reportable events on 2 Dec. 2013: approx. 200 cubic metres of permeate water with pH >9.5 was released to Horsefly Lake over a period of approx. one hour.
2014, Jan.: Port Hope	About 450 Port Hope homeowners have had their soil sampled and properties tested in the first phase of the biggest radioactive clean-up in Canadian history. Some 1.2 million cubic metres of contaminated soil will be entombed in a storage facility. More than 5,000 private and public properties will undergo testing to identify places which need remediation. Port Hope is riddled with low-level radioactive waste, a product of radium and uranium refining at the Eldorado / Cameco refinery. The clean-up will cost an estimated C$1.28 billion.
2014, March	A statement endorsed by 39 medical doctors calls on Cameco to stop promoting dangerous radiation junk science. The statement reads in part: "Cameco has consistently promoted the fringe scientific view that exposure to low-level radiation is harmless. Those views are at odds with mainstream scientific evidence and expert assessment. It is irresponsible for Cameco to consistently promote fringe scientific views regarding the health effects of ionising radiation."
2014, May: Canada	Northerners and environmentalists criticize the ethics and practices of Cameco outside the company's headquarters during its AGM. Candyce Paul said collaboration agreements with her English River First Nation and the Northern Village of Pinehouse Lake are undemocratic. Those deals were negotiated by certain leaders while many people from the communities were left in the dark, she said.
2015	A uranium supply contract was signed by Cameco and India's Department of Atomic Energy on April 15, 2015. Nuclear arms control expert Crispin Rovere said: "As with the proposed Australia–India nuclear agreement, the text of the Canadian deal likewise abrogates the widely accepted principle that the nuclear recipient is accountable to the supplier. This is ironic given it was nuclear material diverted from a Canadian-supplied reactor that led to the India's break-out in the first place. It would be like the citizens of Hiroshima deciding it would be a good idea to host American nuclear weapons within the city – the absurdity is quite astonishing."
2015: Saskatchewan	Cameco's uranium operations in Saskatchewan are facing opposition from the Clearwater Dene First Nation. A group called Holding the Line Northern Trappers Alliance has been camping in the area to block companies from further exploratory drilling in their territory. The group set up camp in November 2014 and plans to remain until mining companies leave. Concerns include Cameco's uranium deal with India and the health effects of Cameco's operations on the Indigenous people of northern Saskatchewan.

2015: Key Lake mill, Canada	Cameco personnel identify the presence of calcined uranium oxide within a building. Five workers receive doses exceeding the weekly action level of 1 mSv.
2016: Smith Ranch ISL uranium mine, Wyoming, USA	The US Nuclear Regulatory Commission finds that a supervisor from Cameco subsidiary Power Resources deliberately failed to maintain complete and accurate records of contamination exit surveys. The NRC also issues a Notice of Violation to Cameco, stating that "between 2006 through 2016 … the licensee failed to calculate the committed effective dose equivalent to all significantly irradiated organs or tissues using the appropriate biological models."
2016: Smith Ranch ISL uranium mine, Wyoming, USA	The Nuclear Regulatory Commission issued a Confirmatory Action Letter to Cameco subsidiary Power Resources documenting actions that the company has agreed to take before resuming shipments of radioactive sludge to a Utah facility. The letter followed two incidents in which containers of radioactive barium sulfate sludge, a byproduct of uranium ore processing, arrived at the facility in Blanding, Utah, with some external contamination from leakage during transport. The incidents occurred in August 2015 and March 2016. The NRC conducted an inspection of Power Resource's Smith Ranch-Highland uranium mine and determined that while the company took some corrective actions after the first incident, they were not fully effective.

In mid-2016, Martu Traditional Owners led a 140 km, week-long walk to protest against Cameco's proposed uranium mine at Kintyre in Western Australia. Photo by Tobias Titz.

WISE/NIRS Nuclear Monitor

The World Information Service on Energy (WISE) was founded in 1978 and is based in Amsterdam, the Netherlands.

The Nuclear Information & Resource Service (NIRS) was set up in the same year and is based in Washington D.C., US.

WISE and NIRS joined forces in the year 2000, creating a worldwide network of information and resource centers for citizens and environmental organizations concerned about nuclear power, radioactive waste, proliferation, uranium, and sustainable energy issues.

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