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Dear readers of the WISE/NIRS Nuclear Monitor,
In this issue of the Monitor:

- Dr Bill Williams writes about the planned uranium and rare earths mine in Greenland.
- Vladimir Slivyak writes about Moscow's latest plans for new reactors, plans that will almost certainly not be realized.
- We write about anti-nuclear protests in China, and plans for a large reprocessing plant.
- Former US Nuclear Regulatory Commission member Peter Bradford writes about the subsidization of nuclear power.

The Nuclear News section has reports on the Montreal Declaration for a Nuclear-Fission-Free World; legal action initiated to attempt to keep liquid radioactive waste off Canadian and US highways; and problems facing the nuclear power program in Belarus.

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.

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An open-pit uranium mine on an Arctic mountain-top

Author: *Bill Williams – Medical Association for Prevention of War; International Campaign to Abolish Nuclear Weapons.*

NM829.4579 As a doctor I routinely get asked for a second opinion, but it is not often that I travel halfway around the world to deliver it. Recently I was invited to assess an old Danish uranium exploration site in Kvanefjeld in southern Greenland. Inuit Ataqatigiit – the opposition party in the national parliament – had asked me to talk to local people about the health implications of re-opening the defunct mine. An Australian firm called Greenland Minerals and Energy (GME) has big plans to extract uranium and rare earth minerals here. It would be a world first: an open-pit uranium mine on an Arctic mountain-top.

From the top of the range above the minesite I looked down across rolling green farmland to the small fishing village of Narsaq. Colourful timber houses rested at the edge of a deep blue strait that the Viking Eric the Red navigated a thousand years ago. Hundreds of icebergs

bobbed on its mirror-like surface. To the east, half way up the valley, a small creek tumbled into a deep rock pool. Behind that saddle lies Lake Tesaq, a pristine Arctic lake that GME plans to fill with nearly a billion tonnes of waste rock. This part of the mine waste would not be the most radioactive, because the company plans to dump this material in a nearby natural basin, with the promise that an 'impervious' layer would prevent leaching into the surrounding habitat.

These mine tailings would contain the majority of the original radioactivity – about 85% in fact – because the miners only want the uranium and the rare earth elements. They would mine and then leave the now highly mobile radioactive contaminants, the progeny from the uranium decay behind: thorium, radium, radon gas, polonium and a horde of other toxins.



Local residents with representatives of Inuit Ataqatigiit

Even at very low levels of exposure, ionising radiation is recognised as poisonous: responsible for cancer and non-cancer diseases in humans over vast timespans. This is why my own profession is under growing pressure to reduce exposure of our patients to X-Rays and CT scans in particular – making sure benefit outweighs risk.

It's also why ERA, the proprietors of the Ranger mine in Australia, are legally obliged to isolate the tailings for at least 10,000 years. While this is hardly possible, the mere fact that it is required highlights the severity and longevity of the risk. My Inuit audience in Narsaq was particularly interested to hear the messages I brought from traditional owners like Yvonne Margarula, of the Mirarr people: "The problems always last, but the promises never do". And Jeffrey Lee from Koongara: "I will fight to the end and we will stop it, then it won't continue on for more uranium here in Kakadu".

When GME started touting this project a decade ago, the spot price of uranium was over US\$120 per pound and everybody in the extractive industry was breaking open the bubbly in anticipation of the 'nuclear renaissance'. We were told that nuclear power would save the world from anthropogenic carbon-carnage and uranium was a stock-market wunderkind. Then came the global financial crisis and the spot-price halved. And then Fukushima melted and the price halved again. The 'renaissance' didn't materialize at all: the real news today is that there has not been one reactor construction start-up so far this year. Not one. Not even in China, the only place where one could honestly claim there has been significant build in the past decade. Consequently, the uranium price has collapsed down to about US\$25 a pound at present.

GME's share price trajectory has mirrored the uranium price – from \$65 a share in 2007 to less than 3 cents

today. Despite this reality GME continues to wax lyrical about the company's prospects. Two years ago the newly elected Greenland national government rescinded a 30-year ban on mining and exporting uranium – but their majority of just one seat in the 31-seat parliament makes this a fragile promise. Inuit Ataqatigiit holds the other 15 seats and is strongly committed to preventing any mine.

Similar division exists in the region where the ore-body is located. The small town of Narsaq deep in the southern fjords has seen much conflict and distress ever since the Australian mining company came to town. While some locals believe the mine would mean jobs and dollars, many of their neighbours are profoundly suspicious and resistant.

When I reached the mine site I was reminded of Tolkien and of Orcs and Goblins. The Danes who first dug down deep into the mountain side 40 years ago left a great grey door fastened tightly into the mine entrance to deter any curious future visitors. And behind the door lies the booty – the fuel for the world's most dangerous weapons and long-lived industrial waste, buried in the mountain top.

If allowed to, GME would dump a billion tonnes of waste rock in a sapphire lake and hundreds of thousands of gallons of liquid radioactive waste in a shallow ditch at the head of a primeval watershed. Then they would pack up and leave within a few decades. But the wastes and risks they would have generated would not. Some of uranium's radioactive byproducts would be a contamination threat to the surrounding region for tens of thousands of years. And as the Inuit Party and a lot of folks in Narsaq have been trying to tell GME, keeping the door open for a truly green Greenland means keeping the great grey door in the mountain firmly shut on uranium mining.

Russia is planning new reactors but prospects are murky

Author: Vladimir Sliviyak – WISE-Russia, Ecodefense

NM829.4580 The Russian government published a new decree on 1 August 2016 outlining plans to build various energy facilities over the next 14 years. The new plan includes mostly fossil fuel plants, but also renewable and nuclear facilities along with final storage facilities for radioactive waste and spent nuclear fuel. The plan is not final – the section on new nuclear reactors says the timing and type of new reactors can be changed.

Russian authorities like to announce big plans but those plans never get implemented the way they were originally announced. In 2008, the Russian government approved the 'General Layout Plan for Siting Power Generation Facilities for the period until 2020', which included 13.2 gigawatts (GW) of new nuclear capacity over the next five years. By March 2010, this goal had been downscaled to just 5.2 GW. In July 2012, Russia's overall nuclear power development target for 2020 – 44 GW – was reduced to 30.5 GW. Currently, Russia has 35 reactors with a capacity of 26 GW.

The new plan includes 11 new reactors to be built by 2030. This figure doesn't include several reactors already under construction – the second Leningrad plant (2 units), second Novovoronezh plant (2 units), Rostov plant (1 unit), and the floating nuclear plant Lomonosov. The latest deadline for completion of the floating nuclear plant is 2019. The second Leningrad and second Novovoronezh plants are both close to completion. Commercial start-up of the second Leningrad plant has been delayed until 2018 as there is no growing demand for electricity due to economic crisis.

The new 2030 plan also doesn't include the second Kursk nuclear plant, where construction was licensed on June 2, 2016. And it doesn't include the nuclear plant near Kaliningrad, where construction was frozen in mid-2013. While Rosatom officials repeatedly confirmed that construction of the Kaliningrad plant was indefinitely suspended, they listed it as under active construction in various documents over the past three years, hoping to attract European investment and then to restart construction. The Kaliningrad nuclear plant was originally designed to export all of its electricity to European neighbors. For internal energy supply of Kaliningrad region, wind, gas and coal plants are proposed in the new governmental plan.

All of the 11 proposed new reactors belong to new designs. Three breeders: BREST-300 near Tomsk in Siberia, and two units of BN-1200 design near Ekaterinburg and Chelyabinsk, near the Ural mountains. For a long time, the idea of a nuclear plant near Chelyabinsk was thought to be dead. The local population voted against it in a local referendum over 25 years ago. In the past, Rosatom repeatedly tried to restart this project but unsuccessfully. Here we are witnessing another attempt.

In 2014, it was announced that the first BN-1200 fast reactor would be completed by 2025. But the fast breeder program has already been delayed, and construction of new reactors under this program hasn't started yet.

The remaining eight new reactors belong to VVER-TOI design (7) and VVER-600 (1). The VVER-TOI was first presented in 2010, but there is not a single reactor of this design under construction or in operation in Russia or anywhere in the world. VVER-600 is an old project developed in the 20th century but never implemented in Russia or anywhere else.

A VVER-TOI nuclear power plant – also referred to as AES-2010 or NPP-2010 – is a two-unit plant with VVER-1300/510 pressurized water reactors. The plant's estimated operating life is 60 years and power output is 1.26 GW per reactor. The designers of the VVER-TOI project claim it includes a combination of passive and active safety systems which makes the plant safer compared to previous designs. However, according to former Russian deputy Minister of Atomic Energy, Bulat Nigmatulin, passive safety systems are not fully passive and still require automatic system response. With concern over their effectiveness, improvement in this field would make both construction and operation more expensive.

The accident control facility of the VVER-TOI project includes a corium trap. It is expected that this trap will capture the molten core material (corium) of the reactor in case of a nuclear meltdown. But Nigmatulin points to a discussion among reactor experts concerning the risk of the trap itself melting if the corium reacts with the material the trap is made of, and hydrogen being released.

VVER-TOI reactors are proposed to be built near the city of Nizhny Novgorod, where a previous attempt to build nuclear reactors met with mass protests which stopped construction. More such units may be built near the cities of Smolensk, Kostroma and in Tatarstan republic. A previous attempt to build a reactor in Tatarstan was cancelled about 25 years ago after mass protests. In Kostroma, a local referendum was held in 1997 which stopped construction.

A VVER-600 reactor is under consideration for Kola peninsula, close to the border with Norway. The existing Kola nuclear plant has four VVER-440 reactors, two of them belonging to the first generation of Soviet designs (the World Nuclear Association notes that the EU has paid to prematurely shut down reactors of this design in countries outside Russia). Kola reactors, some of the oldest in Russia, will be partly replaced by the proposed new VVER-600 unit.

While Russian plans looks big on paper, it is unlikely that this program will be implemented. It's very likely that the current economic crisis, the deepest since the USSR collapsed, will axe most of the new reactors.

Protests against proposed reprocessing plant in China

Author: Jim Green – Nuclear Monitor editor

NM829.4581 Protests erupted against a proposed nuclear reprocessing plant in the Chinese city of Lianyungang on August 6.

Areva and the Chinese government completed negotiations over technical aspects of the reprocessing project in June 2015 and commercial negotiations are ongoing. The 100 billion yuan (US\$15b; €13.3b) plant is to be built by China National Nuclear Corp., based on Areva technology. China wants a plant to process 800 tonnes of spent fuel per year, as well as a MOX fuel fabrication plant modelled on Areva's plant in Melox, southern France. The aim is to build the reprocessing plant from 2020 to 2030.

Lianyungang hosts the Tianwan nuclear plant, which has two power reactors and two more under construction. A 2010 survey of 1,616 local residents showed widespread apprehension about the Tianwan plant: 83.5% of respondents said they "worried about improper handling of nuclear waste" at the plant.¹

The prospect of a nuclear reprocessing plant in addition to the nuclear power station is clearly a bridge too far for many locals. Thousands participated in protests beginning on Saturday August 6, disregarding warnings from the local government and police that they were breaking the law. Protests extended over several days and at times involved confrontations with police.²

According to the August 10 *New York Times*: "The biggest protest in Lianyungang took place on Saturday [August 6], when many thousands of people, including families with children, marched through the downtown area. Despite warnings from the government, protests continued on a smaller scale this week, as residents defied ranks of riot officers with shields, according to news reports and video that people shared through social media."³

Meanwhile, citizens used social media platforms to denounce the proposed reprocessing plant while government censors did their best to remove critical comments.

A media publication under the umbrella of the state-funded Shanghai United Media Group gave this account: "On Monday night [August 8], thousands of residents gathered in front of a primary school near Suning Plaza and yelled "Protest, protest!" at SWAT police wearing heavy riot gear and carrying riot shields. Some residents were throwing water bottles in protest of a Sino-French nuclear fuel recycling project allegedly proposed for the city. Protesters said that since Friday, their numbers had grown significantly until SWAT teams moved in on Sunday night to disperse the crowds. ... Videos that were widely circulated on social media showed SWAT police chasing after citizens and violently beat them as they were lying on the ground. Eyewitnesses confirmed the brutal beatings."⁴

"We don't want this project," said a local citizen. "We worry about whether there will be a leak and whether the technology is good enough to protect people's health."⁵ Another local citizen said: "It is very important to choose a safe location to deal with nuclear waste since it is radioactive. Lianyungang is located in a seismically active area, and there is already a nuclear waste plant here. It is unsafe to see another nuclear project coming and besieging us."⁶

In addition to issuing warnings about unauthorized gatherings, the Lianyungang local government also tried to appease citizens. "The Lianyungang Municipal People's Government has decided to suspend site selection and preliminary work on the nuclear recycling project," the local government said. Yet the possibility of pursuing the project in Lianyungang has not been ruled out, with the provincial government saying that "no final decision had been made" on the location of the plant.⁷ Moreover it is a national project and thus the local government cannot unilaterally suspend or terminate the project.

"Currently, the project is still at the stage of preliminary assessment and comparing potential sites, and nothing has been finally decided," the local government said in an August 8 statement.¹

Lianyungang is one of six sites under consideration for the reprocessing plant, and national authorities are concerned that unrest could spread to the other sites under consideration. Of the six sites, all but one – Gansu Province – is a heavily populated coastal province.³ Gansu is already home to China's first civilian nuclear reprocessing plant, a pilot scale facility beset by technical problems.

China's political leaders are wary of local protests escalating into broader challenges to their power. Local governments are increasingly giving ground in the face of growing public opposition to chemical plants, waste incinerators and other potential sources of pollution – and now proposed nuclear projects are becoming increasingly contentious. A series of deadly accidents at industrial sites has heightened public fears and deepened distrust of government. Xiamen University energy policy specialist Lin Boqiang said: "Public concerns can be contagious and spill over to other cities, as has been the case with various incinerator and PX [chemical] projects."⁸

Wenfeng Tang, a professor of political science at the University of Iowa, said: "While the Chinese government does not hesitate to arrest the few political dissidents, it spends more time and energy to appease public demands. The high level of government sensitivity and responsiveness to public opinion further encourages political activism in Chinese society. The louder you are, the more quickly the government will respond."³

Just as appeasement can encourage and embolden the citizenry, so too repression carries the risks of escalating public protests. *The Financial Times* reported:⁹

“People power – ironically for an authoritarian state – is now seen by the nuclear industry as one of the biggest stumbling blocks to growth. Industry officials point to the precedent of waste incinerators and petrochemical plants that make paraxylene, or PX: local governments have pulled or relocated projects in the face of protests (or in some cases built them in secret behind refinery walls).

“Nuclear industry officials also fret that any attempt to suppress protests with violent policing will lead to a public backlash against the power source. Efforts to keep project planning out of the public eye tend to aggravate public suspicion once a “secret” project becomes known.

“Mao Shoulong, a public policy expert at Renmin University, said the Lianyungang protest would make future nuclear projects more difficult. “Just like the PX protests, if the authorities try to crack down heavily-handedly there will be a huge backlash,” he said. “The government should improve its public policy decision-making process and give the public the right to know, by making the policy-making process more transparent and the siting more scientific.””

An emerging anti-nuclear movement?

In July 2013, officials in southern China shelved plans for a nuclear fuel fabrication plant in Guangdong province after more than 1,000 residents protested.¹⁰ And in February 2013 a nuclear project in Guangxi Province was reportedly halted due to public opposition.¹¹

Proposals to build inland nuclear power plants have also ignited intense opposition according to the *New York Times*.³ The Chinese Academy of Engineering has stated that limited water supplies and poor radiation dispersal make the proposed inland sites more dangerous. He Zuoxiu, a retired nuclear physicist, said: “If there’s an accident, the environmental impact from an inland nuclear station will be far more serious than one on the coast. Imagine if the Fukushima accident had happened on the course of the Yangtze River. Then how many people would have their food and water contaminated?”¹²

Li Ning, a nuclear scientist and dean of the School of Energy Research at China’s Xiamen University, said last year that ‘not in my backyard’ protests were on the rise. “So far, it hasn’t risen to the level of stopping nuclear, but in some areas it is slowing it down,” he said.¹² Speaking to Reuters after the recent protests in Lianyungang, Li Ning said that anti-nuclear actions “are happening more frequently, on a larger scale and in a more agitated way.”¹⁷

Perhaps anti-nuclear protests will achieve nothing more than stopping a few projects and slowing some others, with no significant impact on Beijing’s nuclear plans or broader political structures. At the other end of the spectrum, an emerging anti-nuclear movement may coalesce with other forces to challenge not only the nuclear program but China’s authoritarian political structures more generally.

Waste management

In December 2010, China National Nuclear Corp. started operating a pilot scale reprocessing facility with a design capacity to process spent fuel containing 50 tonne of heavy metal (uranium and plutonium) per year

(50 tHM/yr). But the plant was shut down after a ten-day ‘hot test’ that revealed numerous safety and security issues.¹³ There has been discussion that the small plant would be a template for a larger indigenously-designed plant with a capacity of 200 tHM/yr, but that project does not have government approval.¹⁴

China could abandon plans for reprocessing and opt for direct disposal of spent fuel. A site in Gansu province has been selected as the primary candidate site for a deep underground repository and exploratory work is underway. In the meantime, spent fuel can be stored at reactor sites and at an interim store adjacent to the pilot reprocessing plant – and storage capacity can be increased as necessary.¹⁴

A commercial-scale reprocessing plant will do nothing to help China’s nuclear waste storage and disposal issues. If it helped in any way, it would merely be by acting as a spent fuel storage site and obviating the need to increase capacity at existing storage sites. The International Panel on Fissile Material notes: “One major motivation for reprocessing is to provide an off-site destination for spent fuel accumulating at the reactor sites.”¹⁴ Of course, that aim would be far more easily and cheaply accomplished by simply building a new storage facility instead of a US\$15 billion reprocessing plant.

So why reprocess?

Making best use of finite uranium reserves? China is estimated to have over two million tons of potentially economic uranium resources, so even if China’s nuclear power program expanded to 400 gigawatts by mid-century – greater than current global nuclear capacity, and 13 times greater than China’s current nuclear capacity – only roughly half of the two million tons of uranium resource would be consumed by 2050.¹⁴ China’s current stockpile of about 300 million pounds¹⁵ of refined uranium oxide would suffice to operate its existing reactor fleet for around 20 years. And of course the world is awash with cheap uranium as we’ve repeatedly discussed in *Nuclear Monitor* in recent years.¹⁶

Reprocessing to facilitate nuclear waste management and disposal? Reprocessing does nothing to reduce radioactivity or toxicity, and the overall waste volume, including low and intermediate level waste, is greatly increased by reprocessing.

Reprocessing in support of a fast neutron (breeder) reactor program? China has a 20 MWe experimental fast reactor (CEFR), which operated for a total of less than one month in the 63 months from criticality in July 2010 to October 2015.¹⁷ China also has plans to build a 600 MWe ‘Demonstration Fast Reactor’ and then a 1,000 MWe commercial-scale fast reactor.¹⁷ Whether the 600 MWe and 1,000 MWe reactors are built remains uncertain, and it would be another giant leap from a single commercial-scale fast reactor to a fleet of them.

Building a commercial-scale reprocessing plant in support of an experimental fast reactor program makes no sense. A January 2016 paper from the Belfer Center for Science and International Affairs states: “The planned 200 tHM/yr reprocessing plant and the proposed 800 tHM/yr plant may not be the best facilities for supporting

China's near-term and long-term fuel cycle plans. Fast reactors could be started up with enriched uranium or with plutonium imported from other countries which have large excess stocks available, at far lower cost than building these proposed reprocessing plants."¹⁸

The International Panel on Fissile Material (IPFM) analyzed China's reprocessing program in a July 2015 report and concluded: "China should learn from the experiences of other countries that have prematurely launched large reprocessing programs in the expectation that the commercialization of breeder reactors would follow. The commercialization of breeders did not follow and the result has been hugely costly programs to clean up the reprocessing sites and to dispose of the separated plutonium."¹⁴

Military connections

China's military reprocessing program helped lay the foundation for a civilian reprocessing program, with the small civilian reprocessing plant located next to the large Jiuquan military reprocessing plant and sharing some of its facilities.

The IPFM report argues that the military origins and connections might partially explain the current drive to expand civil reprocessing: "The persistence of civilian reprocessing in nuclear-weapon states reflects in part the strong institutional connections their reprocessing establishments formed within their governments when they were providing plutonium for weapons and the desire of those establishments to continue to have a mission after national requirements for weapons plutonium were fulfilled."¹⁴

Is there any Chinese interest in using ostensibly civil reprocessing plants to separate plutonium for weapons? Possibly, although the use of indigenously-designed, dedicated military facilities might seem a more logical pathway to fissile material for weapons. A reprocessing plant based on Areva technology (and the nuclear materials processed by the plant) would likely be subject to IAEA safeguards. Whether IAEA safeguards would apply was a sticking point between Beijing and Paris according to the IPFM.¹⁴

Henry Sokolski, executive director of the Nonproliferation Policy Education Center, is concerned about the potential for a large reprocessing plant to produce material for weapons, regardless of safeguards:¹⁹

"If China builds and operates this plant, it plans to stockpile plutonium for 10 to 20 years – ostensibly for advanced reactor fuel – producing enough plutonium for between 15,000 and 30,000 bombs, roughly the number of weapons' worth of nuclear explosives that the United States or Russia could remilitarize if they weaponized the massive amounts of surplus nuclear weapons fuel in their respective stockpiles.

"This could be militarily significant. Currently, China's nuclear arsenal is believed to be only 200 to 400 weapons. Its surplus plutonium stockpile, moreover, is only large enough to produce some additional hundreds of bombs, and China lacks any working military plutonium production reactor. Would a Chinese commercial plutonium program serve as a work-around? This may not be China's intention now, but if tensions in the region increased, might this change? One has to hope not."

Similar points could be made about the large reprocessing plant under construction in Japan, and South Korea's efforts to establish reprocessing. Sokolski writes: "What makes these civilian plutonium-recycling efforts all the more dubious is how little economic and technical sense they make. They are not only unnecessary to promote nuclear power or manage nuclear waste, but also clear money losers. Privately, Chinese, Japanese, and South Korean officials and other government advisers concede these points; publicly, they don't."¹⁹

Publicly, Beijing seems committed to reprocessing, but political leaders might yet see sense. Arguments used to promote reprocessing "are beginning to be challenged within China's nuclear establishment" according to the IPFM.¹⁴ While Beijing and Paris announced last year that they have reached agreement on technical aspects of the proposed reprocessing project, they may be deadlocked over costs.

Beijing first signed an agreement with Areva for cooperation on reprocessing and MOX fuel technologies in November 2007. They hoped that a reprocessing plant would be completed in 2020 – but as things stand, construction won't begin until 2020, if indeed it ever begins.

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Compete or suckle: Should troubled U.S. nuclear reactors be subsidized?

Author: *Peter Bradford – Adjunct Professor, Vermont Law School*

NM829.4582 Since the 1950s, U.S. nuclear power has commanded immense taxpayer and customer subsidy based on promises of economic and environmental benefits. Many of these promises are unfulfilled, but new ones take their place. More subsidies follow. Today the nuclear industry claims that keeping all operating reactors running for many years, no matter how uneconomic they become, is essential in order to reach U.S. climate change targets.

Economics have always challenged U.S. reactors. After more than 100 construction cancellations and cost overruns costing up to US\$5 billion apiece, *Forbes Magazine* in 1985 called nuclear power "the greatest managerial disaster in business history ... only the blind, or the biased, can now think that most of the money [\$265 billion by 1990] has been well spent."¹ U.S. Atomic Energy Commission (AEC) Chair Lewis Strauss' 1954 promise that electric power would be "too cheap to meter"² is today used to mock nuclear economics, not commend them.

As late as 1972 the AEC forecast that the United States would have 1,000 power reactors by the year 2000. Today we have 100 operating power reactors, down from a peak of 112 in 1990.³ Since 2012 U.S. power plant owners have retired five units and announced plans to close nine more. Four new reactors are likely to come on line. Without strenuous government intervention, almost all of the rest will close by mid-century.⁴ Because these recent closures have been abrupt and unplanned, the replacement power has come in substantial part from natural gas, causing a dismaying uptick in greenhouse gas emissions.

The nuclear industry, led by the forlornly named lobbying group Nuclear Matters⁵, still obtains large subsidies for new reactor designs that cannot possibly compete at today's prices. But its main function now is to save operating reactors from closure brought on by their own rising costs, by the absence of a U.S. policy on greenhouse gas emissions and by competition from less expensive natural gas, carbon-free renewables and more efficient energy use.

Only billions more dollars in subsidies and the retarding of rapid deployment of cheaper technologies can save these reactors. Only fresh claims of unique social benefit can justify such steps.

When I served on the U.S. Nuclear Regulatory Commission (NRC) from 1977 through 1982, the NRC issued more licenses than in any comparable period since. Arguments that the U.S. couldn't avoid dependence on Middle Eastern oil and keep the lights on without a vast increase in nuclear power were standard fare then and throughout my 20 years chairing the New York and Maine utility regulatory commissions. In fact, we attained these goals without the additional reactors, a lesson to remember in the face of claims that all of today's nuclear plants are needed to ward off climate change.

Nuclear power in competitive electricity markets

During nuclear power's growth years in the 1960s and 1970s, almost all electric utility rate regulation was based on recovering the money necessary to build and run power plants and the accompanying infrastructure. But in the 1990s many states broke up the electric utility monopoly model.⁶

Now a majority of U.S. power generation is sold in competitive markets. Companies profit by producing the cheapest electricity or providing services that avoid the need for electricity.

To justify their current subsidy demands, nuclear advocates assert three propositions. First, they contend that power markets undervalue nuclear plants because they do not compensate reactors for avoiding carbon emissions, or for other attributes such as diversifying the fuel supply or running more than 90 percent of the time.⁷

Second, they assert that other low-carbon sources cannot fill the gap because the wind doesn't always blow and the sun doesn't always shine.⁸ So power grids will use fossil-fired generators for more hours if nuclear plants close.

Finally, nuclear power supporters argue that these intermittent sources receive substantial subsidies while

nuclear energy does not, thereby enabling renewables to underbid nuclear even if their costs are higher.⁹

Nuclear power producers want government-mandated long-term contracts or other mechanisms that require customers to buy power from their troubled units at prices far higher than they would pay otherwise.

Providing such open-ended support will negate several major energy trends that currently benefit customers and the environment. First, power markets have been working reliably and effectively. A large variety of cheaper, more efficient technologies for producing and saving energy, as well as managing the grid more cheaply and cleanly, have been developed. Energy storage, which can enhance the round-the-clock capability of some renewables is progressing faster¹⁰ than had been expected¹¹, and is now being bid into several power markets – notably the market serving Pennsylvania, New Jersey and Maryland.

Long-term subsidies for uneconomic nuclear plants also will crowd out penetration of these markets by energy efficiency and renewables. This is the path New York state has taken by committing at least US\$7.6 billion in above-market payments to three of its six plants to assure that they operate through 2029.¹²

Nuclear power vs. other carbon-free fuels

While power markets do indeed undervalue low-carbon fuels, all of the other premises underlying the nuclear industry approach are flawed. In California¹³ and in Nebraska, utilities plan to replace nuclear plants that are closing early for economic reasons almost entirely with electricity from carbon-free sources.¹⁴ Such transitions are achievable in most systems as long as the shutdowns are planned in advance to be carbon-free.

In California these replacement resources, which include renewables, storage, transmission enhancements and energy efficiency measures, will for the most part be procured through competitive processes. Indeed, any state where a utility threatens to close a plant can run an auction to ascertain whether there are sufficient low-carbon resources available to replace the unit within a particular time frame. Only then will regulators know whether, how much and for how long they should support the nuclear units.

If New York had taken this approach, each of the struggling nuclear units could have bid to provide power in such an auction. They might well have succeeded for the immediate future, but some or all would probably not have won after that.

Closing the noncompetitive plants would be a clear benefit to the New York economy. This is why a large coalition

of big customers, alternative energy providers and environmental groups opposed the long-term subsidy plan.¹⁵

The industry's final argument – that renewables are subsidized and nuclear is not – ignores overwhelming history. All carbon-free energy sources together have not received remotely as much government support as has flowed to nuclear power.¹⁶

Nuclear energy's essential components – reactors and enriched uranium fuel – were developed at taxpayer expense. Private utilities were paid to build nuclear reactors in the 1950s and early '60's, and received subsidized fuel. According to a study by the Union of Concerned Scientists, total subsidies paid and offered to nuclear plants between 1960 and 2024 generally exceed the value of the power that they produced.¹⁷

The U.S. government has also pledged to dispose of nuclear power's most hazardous wastes – a promise that has never been made to any other industry.¹⁸ By 2020 taxpayers will have paid some US\$21 billion to store those wastes at power plant sites.¹⁹

Furthermore, under the 1957 Price-Anderson Act²⁰, each plant owner's accident liability is limited to some US\$300 million per year, even though the Fukushima disaster showed that nuclear accident costs can exceed US\$100 billion. If private companies that own U.S. nuclear power plants had been responsible for accident liability, they would not have built reactors.²¹ The same is almost certainly true of responsibility for spent fuel disposal.

Finally, as part of the transition to competition in the 1990s, state governments were persuaded to make customers pay off some US\$70 billion in excessive nuclear costs.²² Today the same nuclear power providers are asking to be rescued from the same market forces for a second time.

Christopher Crane²³, the president and CEO of Exelon, which owns the nation's largest nuclear fleet, preaches temperance from a bar stool when he disparages renewable energy subsidies by asserting, "I've talked for years about the unintended consequences of policies that incentivize technologies versus outcomes."²⁴ However, he's right about unintended and unfortunate consequences. We should not rely further on the unfulfilled prophecies that nuclear lobbyists have deployed so expensively for so long. It's time to take Crane at his word by using our power markets, adjusted to price greenhouse gas emissions, to prioritize our low carbon outcome over his technology.

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Too cheap to meter, or too expensive to matter?

Bloomberg reported on August 9:

“U.S. electricity consumers could end up paying more than US\$2.5 billion for nuclear plants that never get built. Money collected from ratepayers so far has gone for items including federal licensing, permitting, land purchases, financing and equipment. Utilities including Duke Energy Corp., Dominion Resources Inc. and NextEra Energy Inc. are being allowed by regulators to charge US\$1.7 billion for reactors that exist only on paper, according to company disclosures and regulatory filings. Duke and Dominion could seek approval to have ratepayers pony up at least another US\$839 million, the filings show. ...

“Critics of policies that allow utilities to bill for planned reactors say they’re likely unneeded, and the practice shifts upfront financial risks from shareholders to customers. “The rich get richer and the ratepayers get poorer,” said Mark Cooper, a research fellow at Vermont Law School ...

“At least seven states including Florida allow utilities to collect nuclear licensing and planning costs from customers before any construction begins. In Virginia and Florida, utilities are seeing increased scrutiny of

their plans. The Virginia attorney general has raised concerns about the rising expense of Dominion’s proposed new reactor at its North Anna facility, estimating the total cost at US\$19 billion. ...

“In February, a federal lawsuit was filed on behalf of consumers that seeks to overturn the Florida statute and recover fees charged by Duke and NextEra for nuclear power plants that might not be completed. The suit alleges the companies overcharged customers for projects including Duke’s proposal for two reactors in Levy County and NextEra’s plan for two units at Turkey Point. ...

“Customers can get stuck with the bill long before a single kilowatt of power is produced and may never recoup anything if the nuclear project is later abandoned,” said Jeremiah Lambert, an energy attorney and author of *The Power Brokers*, a history of the electric power industry.”

Mark Chediak, 9 Aug 2016, ‘Customers Could Pay \$2.5 Billion for Nuclear Plants That Never Get Built’, www.bloomberg.com/news/articles/2016-08-08/customers-could-pay-2-5-billion-for-nukes-that-never-get-built

NUCLEAR NEWS

Montreal Declaration for a Nuclear-Fission-Free World

International anti-nuclear campaigners are asking people and organizations to endorse a statement and help build an international network fighting for the abolition of nuclear weapons and the phasing out of civil nuclear reactors. The statement reads, in part:

“As citizens of this planet inspired by the Second Thematic World Social Forum for a Nuclear-Fission-Free World, conducted in Montreal from August 8 to August 12, 2016, we are collectively calling for a mobilization of civil society around the world to bring about the elimination of all nuclear weapons, to put an end to the continued mass-production of all high-level nuclear wastes by phasing out all nuclear reactors, and to bring to a halt all uranium mining worldwide.

“This call goes out to fellow citizens of all countries worldwide who see the need, whether as an individual

or as a member of an organization, for a nuclear-fission-free world. We are committed to building a global network of citizens of the world who will work together, using the internet and social media to overcome isolation, to provide mutual support and to coordinate the launching of joint actions for a world free of nuclear fission technology, whether civilian or military.

“We will begin by creating communication channels to share information and educational tools on legal, technical, financial, medical, and security-related matters linked to military and non-military nuclear activities. We will pool our resources across national boundaries in a spirit of cooperation, allowing us to contribute to the formulation of a convergent and unified response to counteract the plans of the nuclear establishment that operates on a global scale to multiply civil and military nuclear installations worldwide and to dump, bury and abandon nuclear wastes.”

The full statement is posted at
www.ccnr.org/declaration_WSF_e_2016.pdf

To endorse the declaration, send name
and e-mail address to ccnr@web.ca

For background information see

www.beyondnuclear.org/canada/2016/8/18/montreal-declaration-for-a-nuclear-fission-free-world-caps-w.html
www.westmountmag.ca/nuclear-forum/

Groups file for injunction to keep liquid radioactive waste off Canadian and US highways

150 truckloads of liquid nuclear waste are slated to drive through Canadian and US communities from Chalk River, Ontario, Canada to the Savannah River Site, South Carolina, USA. These shipments could begin at any time.

The liquid high-level nuclear waste in question is a corrosive acidic mixture of dozens of highly dangerous radioactive materials including cesium-137, strontium-90, iodine-129, plutonium-239, and weapons-grade uranium-235, left over from the production of medical isotopes at Chalk River.

Although it was previously determined that this liquid waste would be solidified and stored onsite in Canada, the US Department of Energy now plans to truck the 6,000 gallons in liquid form to the Savannah River Site in exchange for US\$60 million.

The Nuclear Information and Resource Service has joined six other nonprofit organizations challenging these unprecedented, high-risk shipments in federal court in Washington, DC, requesting preliminary and permanent injunctions to prevent the import and transport which violates US federal environmental, atomic energy and administrative procedure laws.

The lawsuit is being filed against the Department of Energy (DOE) and National Nuclear Security Administration (NNSA). It charges that the DOE and NNSA failed to provide a thorough public process as required under the National Environmental Policy Act to fully analyze the hazards of transporting liquid highly radioactive waste. An Environmental Impact Statement must be prepared and made available for other federal agencies and citizens to review and comment on, including a discussion of alternative ways to deal with the nuclear waste.

The import and transport of highly radioactive liquid waste is being justified under a U.S.-Canada agreement to return highly enriched uranium to the United States. However, shipping of high-level radioactive waste in liquid form over public roads has never occurred in the 75-year history of U.S. nuclear power, research, medical isotope production, and weapons programs.

U.S. Rep. Brian Higgins (NY – 26) has stated that the proposed shipments raise significant homeland security questions. The US House of Representatives unanimously passed Higgins sponsored legislation requiring an Environmental Impact Statement for the proposal.

“Liquid high-level nuclear waste is known to be among the most dangerous materials on the planet, as we have seen at the Savannah River Nuclear Weapons Site and the nuclear power and weapons reprocessing site at West Valley,

NY,” said Diane D’Arrigo of the Nuclear Information and Resource Service. “There is a good reason why no one has ever tried to move this stuff over public roads before. The material from Chalk River is in the same category.”

“Shipping highly radioactive liquid waste to South Carolina is wildly inappropriate,” said Dr. Gordon Edwards, president of the Canadian Coalition for Nuclear Responsibility. “Chalk River has been solidifying exactly the same kind of liquid waste for over ten years already. In 2011 Chalk River promised to handle all this material on site. It was recently learned that Indonesia is going to be down-blending its high-level liquid waste on site, rather than sending it to the Savannah River Site, and Canada can do the same thing.”

The liquid waste can be solidified and stored at Chalk River, or it can be converted or “down-blended” so that it contains low-enriched, non-weapons grade uranium, which the DOE has said is a viable option. The groups that filed the lawsuit are asking the DOE to thoroughly analyze down-blending as an option for dealing with the waste.

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Belarus nuclear plant work suspended after mishap

The nuclear power program in Belarus has hit snags this year. Russia’s Rosatom (and its subsidiaries) are building two VVER-1200 reactors in Ostroveti, in the Grodno region of Belarus. Operation of the first unit is scheduled for November 2018 and the second unit in July 2020.

In July 2016, construction workers preparing to install a reactor vessel failed to secure it properly and it fell.¹ Local resident Nikolai Ulasevich, a member of the opposition United Civic Party, said the 330-tonne shell had fallen from a height of 2–4m.² The reactor was not damaged, Rosatom said, but Rosatom will replace it with another if that would help restore public confidence in the project.¹

Mikhail Mikhadyuk, deputy energy minister of Belarus, said a decision would be taken on the use of the equipment only after a thorough investigation of the “abnormal situation” and that installation of the reactor shell was suspended pending the investigation. According to subsequent reports, Vladimir Potupchik, energy minister of Belarus, said that Belarus had decided it wanted the equipment to be replaced.³

The Ostrovets nuclear plant is opposed by the government of Lithuania, whose capital Vilnius lies less than 50 km from the site. The power plant will draw cooling water from the Nevis River, which also supplies drinking water in Lithuania. Lithuania agreed to close its own Ignalina nuclear facility as part of its 2004 accession agreement with the EU.²

The Lithuanian foreign minister Linas Linkevicius said the lack of transparency on the part of Belarusian officials was unacceptable: "These incidents, happening from time to time, lack of transparency, we're learning about them from open sources, usually too late. This is not how it should be in reality." Lithuanian president Dalia Grybauskaite said in July that Vilnius would work with the international community to block the plant coming online if Minsk failed to take steps to ensure international safety standards at the site.²

Lithuania is trying to get European countries to boycott import of electricity from the Ostrovets nuclear plant, in an attempt to force the abandonment of the reactor construction project.⁴

The Guardian noted on August 9 that the dropping of the reactor shell was not the only problem at the site this year: "It's not the first mishap at the construction site, nor the first time Belarusian officials have resisted divulging any details. The structural frame of the nuclear service building at the site collapsed in April, as first reported by the Belsat independent TV station. According to the report, supervisors, under pressure to meet a deadline, ordered workers to pour too much concrete causing the structure to collapse. No mention of the accident was made in the Belarusian state media or by officials, with the spokesman at the plant first denying anything had happened. In May, the Belarusian energy ministry, however, did confirm an "incident" had occurred during the pouring of concrete, but the "defect" had been dealt with."²

It's no coincidence that the only two nuclear 'newcomer' countries actually building reactors – Belarus and the United Arab Emirates – are both undemocratic. Climate News Network reported in April:⁵

"Belarus is tightly controlled by the regime of Alexander Lukashenko, in power for the last 21 years. In a 'Chernobyl day' speech in 2008 (26th April) Lukashenko even went so far as to denounce opponents of Ostrovets as "enemies of the state".

"Moreover those who raised questions about the plant have been harassed and arrested. Among them is Belarus journalist Tatyana Novikova – also an environmental campaigner with the environmental NGO Ecohome and an outspoken opponent of the nuclear plant – who was detained by security services on 18th July 2012. Andrey Ozharovskiy, a Russian nuclear expert, was also arrested on the same date. Both were intending to deliver a letter of protest to Russian Prime Minister Dmitry Medvedev, then on a visit to Minsk. But instead they were imprisoned in insanitary conditions for several days. Ozharovskiy was later deported and banned from entering Belarus for ten years."

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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.

The WISE / NIRS Nuclear Monitor publishes information in English 20 times a year. The magazine can be obtained both on paper and as an email (pdf format) version. Old issues are (after 2 months) available through the WISE homepage: www.wiseinternational.org

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