Kat Taylor ~ Testimony Opposing LD 601, LD 342 and LD 343 Nuclear Energy Bills

Friday, March 14, 2025

Good Afternoon Members of the Energy, Utilities and Technology Committee:

My name is Kat Taylor and I am a resident and property owner in Argyle Twp.
This is my **testimony against the passage of three bills** regarding reviving nuclear energy in Maine.

LD 601 ***An Act to Remove State-imposed Referendum Requirements Regarding Nuclear Power*** is the **first step** in the attempt **to bring nuclear back to Maine** by **stripping Mainers of their right, by statute, to vote** on this expensive risky form of energy generation.

LD 342 ***An Act to Include Nuclear Power in the State's Renewable Portfolio Standard*** is an attempt to **add Nuclear Fission energy** to the **state's renewable energy portfolio. Nuclear does not qualify as 'renewable'**, as its **fuel, uranium, is** a finite, **nonrenewable** resource. **Recycling Nuclear fuel** is 'greenwashing'.

LD 343 ***An Act to Direct the Public Utilities Commission to Seek Informational Bids Regarding Small Modular Nuclear Reactors in the State*** would **require an annual RFI** from the **MPUC for Small Modular Reactors (SMRs)** and report back to the EUT committee. **No expiration date**.

LD 343 seeks to **overburden the MPUC indefinitely** to find a nuclear fission scenario that will work. The reasons fission is not feasible are **the massive cost overruns**, the **slow deployment taking years longer than predicted**, if ever, and the **waste,** for which **world leaders still have not found a permanent solution**.

How can we even **consider** nuclear as a ***renewable energy*** choice as **LD 342** would require? Putting the word "**advanced**" in front of ***nuclear energy*** or ***reactors*** does not make them any safer; **nor does *expanding Renewable Energy Standards to include nuclear energy,* make** nuclear **waste biodegradable**.

Statutory definitions of renewable energy usually **exclude many present nuclear energy technologies**, with the notable exception of the state of Utah. Dictionary-sourced **definitions of renewable** energy technologies **often omit or explicitly exclude mention** of **nuclear energy sources, like uranium,** which is **a finite fuel** unlike **wind, water** and **sunshine**.

Nuclear energy is **not always on** as **water and air temperatures are rising** reducing effective cooling sources. **Reactors are shut down during high heat ambient temperatures reducing their output**. Reactors **must run at full capacity** to meet financial goals.

When **determining Renewable designation** we must **consider the entire fuel and waste cycle**. The state requires **any plan for energy generation** have an

environmental impact study, decommissioning and **remediation**. **Disposal of waste is part of any energy solution**; **currently there are no permanent waste disposal solutions for nuclear waste**. And the **processing of uranium contributes to the waste cycle**.

Carbon emissions are not the only criteria, "if the goal is reducing carbon emissions" The reason corporations like **Microsoft, Google, Amazon** and **Apple want nuclear** is to **supply energy to their AI development and data centers** (for Analytics and Crypto Currency, etc.). **Energy usage otherwise has remained flat.**

From the Bangor Daily News 12-30-24: ***In 2024, artificial intelligence was all about putting AI tools to work***

> ***"Building AI systems** behind generative AI tools like OpenAI's ChatGPT or Google's Gemini **requires investing in energy-hungry computing systems running on powerful and expensive AI chips**. They **require so much electricity that tech giants** announced **deals this year to tap into nuclear power to help run them**"*
>
> *"We're talking about **hundreds of billions of dollars of capital that has been poured into this technology**," said* **Goldman Sachs analyst Kash Rangan**. *"We had this fascination that **this technology is just going to be absolutely revolutionary**, which **it has not been** in the two years since the introduction of ChatGPT," Rangan said. "**It's more expensive than we thought** and **it's not as productive as we thought."***

I am not for subsidizing corporate greed. Why should **ratepayers support nuclear** energy for data centers **when it's been proven wind, hydro, solar and battery storage** are **up to the task, much more available, and cheaper**?
Yet, Big Tech will **double down on nuclear,** and **risk our futures, to prove AI is worth it, despite lagging development, just to be first.**

Are we really going to **listen to corporations**, who have **invested hundreds of billions of dollars** into AI; (who **cannot even accomplish** a ***cybersecurity software update*** through CloudStrike without causing the largest IT outage in history); who want to ***convince*** **us** the use of **nuclear energy is** now somehow **needed by the public**, when ***they are driving that need*****?**

Tech corporations are **like** the **Fossil Fuel** industries which **have misled the public for decades** about the **negative effects of their products**. Big Oil **opposed alternatives** to **fossil fuel based energy** development to protect their bottom line. Yet, the **Trump Administration has vowed to open up public lands for drilling, stopped funding renewable energy efforts,** and the Tech Bros are in charge.

What we need is to **replace existing fossil fuel methods of generation** with low-impact, proven methods of renewable energy that are **publicly-owned**, **locally generated**, and Colocated, **providing Maine people with reliable, clean energy**.

But there's **no profit** in that. There is however, major profits to be made by **passing the cost of development on to ratepayers for infrastructure *we will never own***, and

calling it 'renewable energy development' because nuclear would be in the state's Renewable Energy Portfolio and **eligible for all the benefits of that classification**.

LD 601 removes the requirement for approval by a referendum vote by the people *prior* to allowing new nuclear facilities. Our **legislators dismiss our fears** of **nuclear meltdowns**: **Three Mile Island 1979**, **Chernobyl 1986**, and more recently, **Fukushima 2011**. They claim **our concerns are exaggerated** and **we are not experts** in nuclear energy **so *our voices don't count***.

Some issues are simply too big for voters to rely solely on the decisions of elected officials. **A 13 member committee cannot possibly have the experience and understanding of issues equal to the entire population of Maine**. A **referendum is a failsafe measure** needed on issues deemed too important that will affect the whole state.

It was **human error, insufficient secondary systems** and **lack of preparedness** that **caused these accidents**, not the reactors themselves, making clear that **we cannot anticipate the unintended consequences of using nuclear reactors as an energy supply** no matter what their safety records incorrectly report.
History's 6 Worst Nuclear Disasters

Nuclear power was, and still is, **unstable and unpredictable with no solutions for the waste** which take millennia to break down.

Then, there are **Nuclear Weapons**.

I was born in 1956 at the height of the Cold War with the Soviet Union.
My father was a wartime air traffic controller in the Air Force. After serving in the Korean War, he was stationed at **Sondrestrom Air Base** in Greenland, and **Loring AFB,** Limestone, Maine https://en.wikipedia.org/wiki/Loring_Air_Force_Base (one of the largest bases in the U.S. Air Force) as part of the **Strategic Air Command,** the next lines of defense for the **Dew Line**.

I grew up in an atmosphere of terror under the threat of "**Mutually Assured Destruction**" from **nuclear weapons that would reach us in a matter of minutes**. I learned from my father what damage nuclear power can do and **how fast it can happen**. Fear of **nuclear war and radiation fallout** is ingrained in me.

As long as we have nuclear fission power we will have the threat of nuclear weapons. Making nuclear reactors "modular" and smaller does not lessen the danger; it merely spreads the risk over a larger area.

There is a **madman running Russia who wants to bring back the days of Soviet power and threatens the use of nuclear weapons** to achieve his goals.
There are **enemies of the US** and its allies **who would stop at nothing to target nuclear facilities to wreak havoc; essentially making them, dirty bombs**.

As a former IT professional, I have long believed that **our technological advances have far outpaced our moral obligations**. It saddens and angers me that **we**, once

again, **are being forced into decisions that are reactionary** rather than well thought out and planned **because we waited too long to act**.

It is *pure hubris* on the part of those who are trying to force us to take up nuclear energy again in thinking *now* we can achieve success, when we have failed in the past. It was hubris that doomed **Chernobyl** and **Three Mile Island** when **plant managers claimed what was happening before their eyes was impossible**, even as catastrophe unfolded.

Lack of preparation, toothless support, ambitious politicians and **exponential greed** have put us in a place where ***we are considering nuclear fission generated energy as the way to save our planet***.

The irony is breathtaking.

~Kat Taylor
Argyle Twp.

"Our inventions are wont to be pretty toys,
which distract our attention from serious things.
They are but improved means to an unimproved end…"
~ Henry David Thoreau

Kat Taylor Testimony – Nuclear Energy

Last Updated: Friday, March 14, 2025

Supplemental Information for Nuclear Energy Bills:

LD 601 ***An Act to Remove State-imposed Referendum Requirements Regarding Nuclear Power***
LD 342 ***An Act to Include Nuclear Power in the State's Renewable Portfolio Standard***
LD 343 ***An Act to Direct the Public Utilities Commission to Seek Informational Bids Regarding Small Modular Nuclear Reactors in the State***

Nuclear News

U.S. nuclear energy 'revival' led by tech companies, government investment – UPI.com

Jan. 3, 2025

> ***"Google, Microsoft and Amazon are among the technology companies looking to nuclear power to produce energy*** *with a smaller carbon footprint. Environmental organizations remain skeptical, if not outright opposed to the use of nuclear energy.*
>
> ***Existing data centers consume about 4% of all electricity generated in the United States.*** *That need is expected to* ***more than double*** ***by 2030*** *as more data centers are constructed, according to the Department of Energy.*
>
> ***The investments from the tech industry play a large role in the recent nuclear resurgence. Energy hungry data centers will require a reliable energy source****.*
>
> *The* ***chief concern about storage of waste among skeptics is that radiation will make its way into the water table due to the containment casks corroding and the waste dissolving."***

https://www.upi.com/Top_News/US/2025/01/03/nuclear-energy-revival-tech-ai/5801735919080/

Valuing the greenhouse gas emissions from nuclear power

December 1, 2009

> *"Nuclear power generation itself doesn't produce greenhouse gases, but* ***what is often overlooked are the emissions over the entire lifecycle of a reactor*** *and all its* ***inputs****.* ***Nuclear facilities emit greenhouse gases during the initial construction****,* ***when uranium ore is mined*** *and* ***processed,*** *and* ***waste treated and stored.*** *Finally,* ***a reactor must be decommissioned at the end of its life*** *and* ***mines reclaimed****.* ***All*** *of these* ***activities*** *can* ***result in the emission*** *of* ***greenhouse gases****, and* ***thus contribute to global warming****.*

Lee Kuan Yew School of Public Policy at the National University of Singapore *analyzed more than* ***100 prior studies*** *to arrive at a* ***best estimate*** *of the emissions of nuclear power plants.*

The ***key findings*** *include:*

- *The mean value of* ***carbon dioxide emissions over the lifetime of a nuclear reactor*** *is* ***66 grams per kilowatt-hour of electricity****.*
- ***Nuclear power emits more greenhouse gases per kilowatt hour than all renewables****, including* ***biomass*** *(up to* ***41 grams*** *per kilowatt hour),* ***hydroelectric*** *and* ***solar*** *(up to* ***13 grams*** *per kilowatt hour), and* ***wind*** *(up to* ***10 grams*** *per kilowatt hour).*
- *Reactors produce significantly less carbon dioxide than all fossil fuels. The cleanest is* ***natural*** *gas (****443 grams*** *per kilowatt hour), while the* ***most carbon dioxide*** *is produced by* ***coal (up to 1,050 grams*** *per kilowatt hour).*

The author concludes by stating that ***studies of greenhouse-gas emissions associated with nuclear power need to be more accurate****,* ***accountable****, and* ***transparent****, and* ***urges the development of a formal standard*** *for* ***reporting emissions****.*
https://www.sciencedirect.com/science/article/abs/pii/S0301421508001997

Microsoft Buys Radioactive 3-Mile Island – The Cherokee Scout

December 10, 2024

"In 1979, the ***Unit 2 nuclear reactor malfunctioned****, causing it to melt down during usage and* ***release radioactive gasses into the environment****. Afterward, residents of Pennsylvania began to report signs of radiation exposure to local hospitals, and the* ***Three Mile Island power plant was considered officially contaminated.***
Due to Three Mile Island's impact on nuclear science throughout US history, Microsoft's agreement to purchase the ***Unit 1 reactor*** *has caused some controversy.*
Microsoft plans to use the reactor to power AI data centers*. After this purchase,* ***they will have 100% ownership*** *over Three Mile Island's* ***generated electricity****."*

https://cherokeescout.org/5163/features/microsoft-buys-radioactive-3-mile-island/

Has DeepSeek Popped The "Mini Nuke" Bubble For AI Power?

Jan 28, 2025

"More broadly, ***the emergence of DeepSeek*** *this week is* ***a reminder that energy efficiency is a better bet than one of the largest energy production ramp-ups in human history. DeepSeek is the opening act in the final solution****, which is* ***delivering the same AI capabilities at a fraction of the cost****.* ***DeepSeek's AI models*** *seem to be* ***faster, smaller, and a whole lot cheaper, necessitating less energy*** *than U.S. rivals.*

This is what I suspected, and it matches what I hear when talking to the top players: ***The SMR approach feels like a crapshoot****. In short, the AI power*

*bubble **may end up being a borderline con**—not unlike the SPAC bubble and bust from the COVID-19 pandemic era. While ideas for nuclear development are a dime a dozen, **"mini nukes" often look more like "paper nukes,"** meaning that **they have no product, no actual design, no technology that has been tested or vetted, and no progress on regulatory approval**. More likely than not, these paper nukes **won't even present an actionable product** until **2040** or **2050**."*

https://www.forbes.com/sites/johnrau/2025/01/28/has-deepseek-popped-the-mini-nuke-bubble-for-ai-power/

The Ezra Klein Show

Mar 4, 2025

Ezra Klein of the NY Times talks to **Ben Buchanan**, the **top adviser on A.I. in the Biden White House**. Trump has not rolled back Biden's executive orders on AI yet.

https://youtu.be/Btos-LEYQ30?si=a6UwmuWZSO0hkTn8

CSIS

Mar 5, 2025

Energy Security and Climate Change Program –

*"A conversation with **Vivian Lee**, Managing Director and Partner at Boston Consulting Group (BCG) and **Shanu Mathew**, Portfolio Manager and Research Analyst at Lazard Asset Management. Vivian and Shanu will discuss the state of **AI electricity demand**, the **implications of DeepSeek**, the trend towards **colocation**, prospects for **nuclear**, and other **key dynamics** at the **intersection** of **AI and electricity**. **Cy McGeady**, Fellow with the CSIS Energy Security and Climate Change Program, will **moderate** the conversation:*

https://www.youtube.com/live/GfpB7VQnoQ4?si=kKaQZY6W8ydy0qN0

Peter Dutton's "always on" nuclear power is about as reliable as wind and solar – during a renewables drought | RenewEconomy

March 11, 2025

*"One of **Peter Dutton's key selling points** for nuclear power, **its "always on"** reliable generation of electricity, has been put to the test in **a new analysis, which found that a fleet of modern nuclear plants is, on balance, about as reliable as a fleet of wind and solar farms – if those wind and solar farms were in the midst of a very bad renewable energy drought.***

*The analysis by **David Osmond, a senior wind engineer** who runs weekly simulations of Australia's main electricity grid, **compared outages experienced by solar and wind during renewables droughts** – known as "dunkelflaute" – to **outages in nuclear** energy generators.*

*Using fleet data grouping outage periods into peak and off-peak months, Osmond found that during its "worst week" in any month, **nuclear experienced a reduction to 8% to 70% of average output, and 44% to 77% in peak months – comparable to the "worst week" experienced by renewable energy over the modelled 42 years**.*

> *"**Nuclear isn't 100% reliable**," Osmond writes on BlueSky. "**Multiple outages can occur simultaneously, even during peak demand months."***

https://reneweconomy.com.au/peter-duttons-always-on-nuclear-power-is-about-as-reliable-as-wind-and-solar-during-a-renewables-drought/

Say no to small modular reactors: Stop normalizing the exploitation of nature - Bulletin of the Atomic Scientists

April 1, 2024

> *"In addition to the waste and proliferation problems, **small modular reactors will not be built and operating in time to be an effective climate solution**. Canada's climate targets involve **decreasing greenhouse gas emissions to 40 per cent below 2005 levels by 2030** and **reaching net-zero by 2050**. However, ARC predicts that it will **finish building its first small modular reactor by 2028** which will "replace the existing **coal generation station in 2030**" at Point Lepreau **Nuclear Generating Station in Saint John, New Brunswick**. And Moltex **does not expect to have an "operational reactor**" until "the early **2030s**."*

https://thebulletin.org/2024/04/say-no-to-small-modular-reactors-stop-normalizing-the-exploitation-of-nature/

Kernenergie und Klima - Scientists for Future

Published October 16, 2021

English Abstract:

> *"In light of the accelerating climate crisis, nuclear energy and its place in the future energy mix is being debated once again. Currently its share of global electricity generation is about 10 percent. Some countries, international organizations, private businesses and scientists accord nuclear energy some kind of role in the pursuit of climate neutrality and in ending the era of fossil fuels. The IPCC, too, includes nuclear energy in its scenarios. On the other hand, the experience with commercial nuclear energy generation acquired over the past seven decades points to the significant technical, economic, and social risks involved. This paper reviews arguments in the areas of "technology and risks," "economic viability," 'timely availability," and "compatibility with social-ecological transformation processes."*
>
> **Technology and risks:** *Catastrophes involving the release of radioactive material are always a real possibility, as illustrated by the major accidents in Three Mile Island, Chernobyl, and Fukushima. Also, since 1945, countless accidents have occurred wherever nuclear energy has been deployed. No significantly higher reliability is to be expected from the SMRs ("small modular reactors") that are currently at the planning stage.*
>
> **Nuclear energy and economic efficiency:** *The commercial use of nuclear energy was, in the 1950s, the by-product of military programmes. Not then, and not since, has nuclear energy been a competitive energy source. Even the*

continued use of existing plants is not economical, while investments into third generation reactors are projected to require subsidies to the tune of billions of $ or €. The experience with the development of SMR concepts suggests that these are prone to lead to even higher electricity costs. Lastly, there are the considerable, currently largely unknown costs involved in dismantling nuclear power plants and in the safe storage of radioactive waste.

Detailed analyses confirm that meeting ambitious climate goals (i. e. global heating of between 1.5° and below 2° Celsius) is well possible with renewables which, if system costs are considered, are also considerably cheaper than nuclear energy. Given, too, that nuclear power plants are not commercially insurable, the risks inherent in their operation must be borne by society at large. The currently hyped SMRs and the so-called Generation IV concepts (not light-water cooled) are technologically immature and far from commercially viable.

Timely availability: *Given the stagnating or – with the exception of China – slowing pace of nuclear power plant construction, and considering furthermore the limited innovation potential as well as the timeframe of two decades for planning and construction, nuclear power is not a viable tool to mitigate global heating. Since 1976, the number of nuclear power plants construction starts is declining. Currently, only 52 nuclear power plants are being built. Very few countries are pursuing respective plans. Traditional nuclear producers, such as Westinghouse (USA) and Framatome (France) are in dire straits financially and are not able to launch a significant number of new construction projects in the coming decade. It can be doubted whether Russia or China have the capacity to meet a hypothetically surging demand for nuclear energy but, in any event, relying on them would be neither safe nor geopolitically desirable.*

Nuclear energy in the social-ecological transformation: *The ultimate challenge of the great transformation, i. e. kicking off the socio-ecological reforms that will lead to a broadly supported, viable, climate-neutral energy system, lies in overcoming the drag ("lock-in") of the old system that is dominated by fossil fuel interests. Yet, make no mistake, nuclear energy is of no use to support this process. In fact, it blocks it. The massive R&D investment required for a dead-end technology crowds out the development of sustainable technologies, such as those in the areas of renewables, energy storage and efficiency. Nuclear energy producers, given the competitive environment they operate in, are incentivized to prevent – or minimize – investments in renewables. For obvious technical as well as economic reasons, nuclear hydrogen*
– the often-proclaimed deus ex machina – cannot enhance the viability of nuclear power plants. Japan is an exhibit A of transformation resistance. In Germany the end of the atomic era proceeds, and the last six nuclear power stations will be switched off in 2021 and 2022, but further steps are still needed, most importantly the search for a safe storage facility for radioactive waste.

By way of conclusion: *The present analysis reviews a whole range of arguments based on the most recent and authoritative scientific literature. It confirms the assessment of the paper Climate-friendly energy supply for Germany – 16 points of orientation, published on 22 April 2021 by Scientists for Future (doi.org/10.5281/zenodo.4409334) that nuclear energy cannot, in the*

short time remaining before the climate tips, meaningfully contribute to a climate-neutral energy system. Nuclear energy is too dangerous, too expensive, and too sluggishly deployable to play a significant role in mitigating the climate crisis. In addition, nuclear energy is an obstacle to achieving the social-ecological transformation, without which ambitious climate goals are elusive."

https://zenodo.org/records/5573719#.YZZQi7hKg2z

Maine Nuclear

Commentary: Nuclear power won't help Maine reach its clean-energy Goals

May 24, 2023
Gerry Runte
Special to the Press Herald

"In Maine and in state legislatures across the nation, the nuclear industry lobby is promoting a renewed call for investments in ***nuclear technology*** *as a* ***source of clean energy****. In the Maine Legislature, there have been three bills this session –* L.D. 486, L.D. 689 and L.D. 1549 *– that would promote nuclear power plants in our state.*

*"While it's important that Maine pursues solutions to provide affordable, clean energy****, nuclear power isn't the answer – and likely never will be.***

Commercial nuclear power is a business*, and like all businesses,* ***it requires a market-competitive, customer-appealing product****. The hard truth is that when a product isn't financially viable and* ***there are more cost-effective alternatives available****,* ***market demand evaporates****.* ***Nuclear power has failed in the competitive market*** *of electricity generation, where there are less complex, more affordable choices.*

It's important that the state not be swayed by this most recent campaign promising cheap nuclear electricity just over the horizon. It was just over the horizon 50 years ago, and will remain just over the horizon 50 years from today*."*

https://www.pressherald.com/2023/05/24/commentary-nuclear-power-wont-help-maine-reach-its-clean-energy-goals/

Nuclear Energy Revival Unlikely, Especially in Maine

Rep. Gerry Runte

"Gerry began his career as ***Nuclear Fuel Manager with General Public Utilities Corporation*** *(GPU). At the time GPU was one of the few utilities contracting for* ***all stages of the nuclear fuel cycle and was acquiring fuel for the systems four nuclear units: Three Mile Island Units 1 and 2; Oyster Creek and Forked River.***

After the accident at TMI-1, ***Runte*** *was a member of a small team that successfully* ***raised the additional $750 million*** *necessary* ***to complete cleanup****. He was the owner's representative for Cajun Electric G&T's 30% on the management team of River Bend Nuclear Station. In the late 80s and early 90s, Runte was* ***Manager of Rate Affairs for GPU Nuclear Corporation****, where he implemented a program to assure the corporation's preparedness to* ***withstand operational*** *and* ***management prudence reviews****.*

https://**gerryrunte**.substack.com/p/nuclear-energy-revival-unlikely-especially

Gerry holds a ***B.S. and a masters in Nuclear Engineering****, both from Pennsylvania State University."*

https://worthingtonsawtelle.com/about-us/

Prudence Review

"Prudence is a standard often used in management audit. ***Prudence issue considered frequently in the course of a revenue requirements case*** *(rate case). Should the* ***utility be permitted to recover from customers*** *(through rates****) the cost*** *of* ***"unfortunate" investments or actions****?"*

https://pubs.naruc.org/pub.cfm?id=537CC901-2354-D714-5154-339AD3909936

Jevons paradox

https://duckduckgo.com/?t=ffab&q=Jevons+paradox&ia=web

"In economics, the ***Jevons paradox occurs when technological advancements make a resource more efficient to use****; however, as the cost of using the resource drops, if the price is highly elastic, this results in* ***overall demand increases*** *causing total* ***resource consumption to rise****. Governments have typically expected efficiency gains to lower resource consumption, rather than anticipating possible increases due to the Jevons paradox.*
More at "Wikipedia"

Nuclear power is making a comeback in the U.S. But not in Maine.

December 1, 2024

"Rep. Gerry Runte, D-York, a member of the Legislature's Energy, Utilities and Technology Committee, opposed the legislation, which he said was not intended for legislative action. "These campaigns to promote a particular technology are for investors," he said.

Seth Berry, a former co-chairman of the committee, said pro-nuclear power advocates in the Legislature try unsuccessfully every few years to "knock the dust off" nuclear power legislation.

*"****There's the realization that it's not going anywhere," he said. "There isn't interest in taking on that expense****."*

Jack Shapiro, climate and clean energy director at the Natural Resources Council of Maine*, said the* ***state benefits from solar and wind power resources*** *that "don't have the question marks that come with something like advanced nuclear."*

https://www.pressherald.com/2024/12/01/nuclear-power-is-making-a-comeback-in-the-u-s-but-not-in-maine/

Maine History Online - Nuclear Energy for Maine?

> *"**Maine Yankee ceased operations on December 18, 1996**. It had been closed since the **end of 1995** for repairs. **Cracks had been discovered in steam generator tubes**. The cracks apparently had **had been present since 1990 but had gone undetected**.*
>
> *An inspection by the Nuclear Regulatory Commission prompted the need for repairs. The nuclear watchdog activists had sought the inspection.*
>
> *The company maintained that the plant was still safe, but decided to close it because it was **no longer economically viable to operate**. It was dismantled, with that **work completed in June 2005.***
>
> ***Because no long-term spent fuel storage site exists in the U.S., the 900 tons of spent fuel rods will be stored at the Maine Yankee site until at least 2023.***

https://www.mainememory.net/sitebuilder/site/804/page/1214/display

Why Canada could become the next nuclear energy 'superpower'

13 November 2024

> *"And not all of Canada is on board with the country's uranium industry.*
>
> *British Columbia sits on its own supply of uranium but has not allowed any nuclear plants or uranium mines to operate in the province since 1980.*
>
> ***Critics have also expressed concern about radioactive waste nuclear reactors leave behind for future generations**.*
>
> ***Others fear another Fukushima-scale disaster**, where a tsunami disabled three reactors, **causing the release of highly radioactive materials** and forcing mass evacuations.*
>
> *"The risk is not zero, that is for sure" though it can be reduced, said Prof Piro.*

https://www.bbc.com/news/articles/c5yjnkgz0djo

Canada poised to dominate the global uranium mining industry | National

> *"**Demand for uranium is expected to double by 2040** thanks to a surge of interest in nuclear power — **31 countries have pledged to triple their nuclear power output by 2050** and **tech companies are investing in nuclear to power their data centres.***
>
> ***Canada's uranium sector also stands to gain from geopolitical tensions** that have forced Western buyers to **rethink the wisdom of relying on Kazakhstan***

*— which is **bordered by Russia** and **counts China** as its **largest customer** — as a key supplier."*

https://dailyhive.com/canada/canada-global-uranium-mining-industry

Nuclear Accidents:

history.com

History's 6 Worst Nuclear Disasters

Jennie Cohen

https://www.history.com/news/historys-worst-nuclear-disasters

List of nuclear power accidents by country - Wikipedia

> *"Worldwide, **many nuclear accidents and serious incidents** have occurred **before** and **since the Chernobyl disaster in 1986**. **Two thirds of these mishaps occurred in the US**. The French Atomic Energy Commission (CEA) has concluded that **technical innovation cannot eliminate the risk of human errors in nuclear plant operation.***
>
> *The nuclear power industry has improved the safety and performance of reactors, and has proposed new safer (but generally untested) reactor designs but **there is no guarantee that the reactors will be designed, built and operated correctly**.[2] Mistakes do occur and the **designers of reactors at Fukushima in Japan did not anticipate that a tsunami generated by an unexpected large earthquake would disable the backup systems** that were supposed to stabilize the reactor after the earthquake.*
>
> ***Catastrophic scenarios involving terrorist attacks are also conceivable**.*
>
> *An interdisciplinary **team from MIT** has estimated that **given the expected growth** of nuclear power **from 2005 to 2055**, at least **four serious nuclear accidents** would be **expected** in that period."*

https://en.wikipedia.org/wiki/List_of_nuclear_power_accidents_by_country

A Brief History of Nuclear Accidents Worldwide | Union of Concerned Scientists

Oct 1, 2013

https://www.ucsusa.org/resources/brief-history-nuclear-accidents-worldwide

Nuclear Waste:

Advanced reprocessing of spent nuclear fuel – Wikipedia

https://en.wikipedia.org/wiki/Advanced_reprocessing_of_spent_nuclear_fuel

Fast Breeder Reactors: A solution for nuclear waste or an eternal empty promise? – IO

11 April 2023

Sustainability *- By* ***employing techniques*** *like* ***pyroprocessing****, scientists have* ***developed ways to recycle used fuel without separating pure plutonium****, thereby* ***mitigating proliferation risks****.*

Analysis

"European fast breeder reactor project was the ***Superphénix*** *in France. Designed with a* ***1.20 GW*** *electrical power* ***output****, the reactor faced technical challenges, particularly with its* ***liquid sodium cooling system, which suffered from corrosion and leaks****. During its* ***11 years of operation****, the plant experienced* ***53 months*** ***of normal operations (mostly at low power****),* ***25 months of outages*** ***due to technical problems****, and* ***66 months spent on halt due to political and administrative issues.***

A fast breeder reactor can significantly extend the use of currently available nuclear waste by extracting more energy from it, but it cannot entirely eliminate the need for mining uranium or plutonium*. Greenpeace argues that nuclear power is not the way to a green and peaceful zero-carbon future for six reasons, including* ***high costs, slow deployment****,* ***and toxic waste*** *production.* ***The organization highlights that large volumes of radioactive waste are produced by nuclear fuel cycles, and no government has resolved how to safely manage this waste***

The ***Superphénix*** *was a focal point for anti-nuclear groups, including the Green Party Les Verts, and faced significant opposition throughout its planning and construction stages.* ***In 1997, French Prime Minister Lionel Jospin announced the plant's closure, citing its excessive costs****.*

https://innovationorigins.com/en/fast-breeder-reactors-a-solution-for-nuclear-waste-or-an-eternal-empty-promise/

Small modular reactors produce high levels of nuclear waste |

Stanford Report
May 30th, 2022

"Our results show that ***most small modular reactor designs will actually increase the volume of nuclear waste in need of management and disposal****,* ***by factors of 2 to 30*** *for the reactors in our case study," said study lead author Lindsay Krall, a former MacArthur Postdoctoral Fellow at* ***Stanford University's Center for International Security and Cooperation (CISAC)****. "These findings stand* ***in sharp contrast*** *to the* ***cost and waste reduction benefits*** *that* ***advocates*** *have* ***claimed for advanced nuclear technologies****."*

Neutrons escape from the core – a problem called neutron leakage *– and* ***strike surrounding structural materials, such as steel and concrete****. These materials become radioactive when "activated" by neutrons lost from the core.*

We found that ***small modular reactors will generate at least nine times*** *more* ***neutron-activated steel*** *than conventional power plants. These radioactive materials have to be carefully managed prior to disposal, which will be expensive."*

*Some small modular reactor designs call for **chemically exotic fuels and coolants** that can produce **difficult-to-manage wastes** for disposal," said co-author Allison Macfarlane, professor and director of the School of Public Policy and Global Affairs at the University of British Columbia. "Those exotic fuels and coolants **may require costly chemical treatment** prior to disposal."*

*"**Simple metrics**, such as estimates of the mass of spent fuel, **offer little insight** into the **resources** that will be **required** to store, package, and dispose of the spent fuel and other radioactive waste," said Krall, who is now a scientist at the Swedish Nuclear Fuel and Waste Management Company. "In fact, **remarkably few studies** have **analyzed the management and disposal of nuclear waste** streams **from small modular reactors**."*

*The back end of the fuel cycle **may include hidden costs** that must be addressed," Macfarlane said. "It's in the best interest of the reactor designer and the regulator to **understand the waste implications of these reactors**."*

The study concludes that, overall, **small modular designs are inferior to conventional reactors with respect to radioactive waste generation**, management requirements, **and disposal** options.

https://news.stanford.edu/stories/2022/05/small-modular-reactors-produce-high-levels-nuclear-waste

Nuclear Waste Is Piling Up. Does the U.S. Have a Plan? | Scientific American
March 6, 2023

*"**Forty years after the passage of the Nuclear Waste Policy Act**, there is, **"no clear path forward for the siting, licensing, and construction of a geologic repository" for nuclear waste**, according to a recent U.S. National Academies of Science, Engineering and Medicine report.*

*The good news is that **there is already a clear strategy** for managing and disposing of this highly radioactive material. **The bad news is that the U.S. government has yet to seriously follow that plan.***

*The National Academies report tells us that **new or advanced reactor designs—the hoped-for saviors of the nuclear industry—will not save us from the need to build geologic repositories, deep-mined facilities for permanent nuclear waste disposal.** In **some cases**, these **new reactors** may **make it worse by creating more waste** that's **more costly to manage**, **new kinds of complex waste, or just more waste, period**. Before we face that onrush, **we first need to deal with the large volume of waste we've already produced."***

https://www.scientificamerican.com/article/nuclear-waste-is-piling-up-does-the-u-s-have-a-plan/

Nuclear Conflict:

foreignaffairs.com

Get Ready for the Next Nuclear Age

March 8, 2025

> *"**As the second Trump administration rapidly dismantles crucial elements of the postwar international order**, it seems not to have considered some obvious possible **consequences of its actions**—such as the **triggering of a new round of nuclear proliferation, this time not by terrorists or rogues but by the countries formerly known as U.S. allies.***
>
> *Turning back the foreign policy clock a century **won't erase the existential threat we contend with today: namely, widespread nuclear expertise and relatively cheap, easy nuclear technology.** The **nonproliferation regime that keeps widespread acquisition of nuclear weapons at bay is a voluntary act of concerted national self-restriction**, one that **countries adhere to** because they **feel safer with that regime than** they would **without it.***
>
> *But they feel safe in large part because **the regime is nestled within a broader international system policed by generally benign American power**. It is this web of cooperative international partnerships, including institutions such as NATO, that the **Trump administration is currently shredding**."*

https://www.foreignaffairs.com/united-states/nuclear-age-proliferation-trump-nato-gideon-rose

Trump's nuclear dilemma: "Greatest threat" is getting bigger

Mar 11, 2025

> ***"President Trump calls nuclear weapons the "greatest existential threat"** humanity faces, but **he may be ushering in a world of more nuclear powers and fewer nuclear guardrails**.*
>
> ***Why it matters:** Trump on Sunday reiterated **his urgent hope to halt the nuclear spiral in which China, Russia and the U.S. are developing ever-more sophisticated tools to end life on Earth.***

https://www.axios.com/2025/03/11/trump-nuclear-weapons-iran-russia-china

Nuclear Terrorism: Assessment of U.S. Strategies to Prevent, Counter, and Respond to Weapons of Mass Destruction | The National Academies Press

2024

> *"For **nearly eight decades**, the world has been **navigating the dangers of the nuclear age**. Despite **Cold War tensions and the rise of global terrorism**, **nuclear weapons have not been used in conflict** since Hiroshima and Nagasaki in 1945.*

*Efforts such as **strategic deterrence, arms control and non-proliferation agreements, and the U.S.-led global counterterrorism** have **helped to keep nuclear incidents at bay.***

*However, the nation's success to date in **countering nuclear terrorism does not come with a guarantee,** success often **carries the risk** that other challenges **will siphon away attention** and **resources** and can lead to the perception that the threat no longer exists."*

https://nap.nationalacademies.org/catalog/27215/nuclear-terrorism-assessment-of-us-strategies-to-prevent-counter-and

Vulnerability of nuclear facilities to attack – Wikipedia

*"An **ongoing concern** in the area of nuclear safety and security is the **possibility** that **terrorist organizations may attack facilities possessing radioactive material** in order to **cause widespread radioactive contamination or to construct nuclear weapons.***

*Such **facilities may include nuclear power plants**, **civilian research reactors**, **uranium enrichment plants**, **fuel fabrication plants**, **uranium mines**, and **military bases** where **nuclear weapons are stored**. The attack threat is of several general types: **commando-like ground-based attacks on equipment** which if disabled **could lead to a reactor core meltdown** or **widespread dispersal of radioactivity**, external attacks such as an **aircraft crash into a reactor complex, or cyber attacks.***

https://en.wikipedia.org/wiki/Vulnerability_of_nuclear_facilities_to_attack

Nuclear power: future energy solution or potential war target? - Bulletin of the Atomic Scientists

*"**Innovative small modular reactors, floating nuclear plants, and microreactors** offer **potential routes to decarbonization** that many countries are embracing. However, these emerging technologies **elevate concerns that wartime attacks could expose warfighters and civilians to nuclear fallout**. The **risk of such exposure** could **enable states or non-state actors** to **threaten nuclear consequences without violating** the **taboo against using nuclear weapons—weakening international resolve to intervene in conflicts**.*

*Russia's occupation of **Ukraine's Zaporizhzhia nuclear power plant** has already **set a dangerous precedent** that could **sway the course of future wars**. More recently, **Russia's Kursk nuclear power plant** also came under threat **when Ukrainian forces advanced across the border**.*

The threat to these nuclear facilities underscores how both Russia and Ukraine view nuclear power plants as strategic assets** that could bolster their negotiating positions in potential cease-fire discussions. **Nuclear power plants could increasingly become strategic targets in war**, and the **emergence of

advanced nuclear technology is likely to spread that danger to new regions of the world."

https://thebulletin.org/2024/09/nuclear-power-future-energy-solution-or-potential-war-target/

We choose to go to the moon

September 12, 1962
John F. Kennedy
President of the United States.

> *"We set sail on this new sea because there is new knowledge to be gained, and new rights to be won, and they must be won and used for the progress of all people.* ***For Space Science, like nuclear science and all technology, has no conscience of its own****.* ***Whether it will become a force for good or ill depends on man.*** *And only if the United States, occupies a position of preeminence, can we help* ***decide whether this new ocean will be a sea of peace, or a new terrifying theatre of war."***