We Negate

Contention 1 is Court Clog

Courts are working efficiently now

Reuters '23 [Thomson Reuters; February 3; News and information services company, citing the second annual State of the Courts report, which included a survey of over 200 judges; Thomson Reuters, "Court efficiency: Using legal technology to alleviate delays," https://legal.thomsonreuters.com/blog/using-legal-technology-to-alleviate-delays/] recut //cy

Courts are investing in **tech**nology: Almost **two-fifths** reported an introduction of new/**improved methods**/processes or **service innovations** in the past **12 months**. The top improvements are **E-filing**, Zoom/Web-Ex/Teams, etc., and **virtual/remote hearings**. Although these are critical **tech**nology **investments** for a court's **digital infrastructure**, more can be done to ensure the judge has access to all relevant information and legal analysis to make **faster decisions** with confidence. **Virtual** courts are here to stay: Naturally, the pandemic also seems to have spawned a broader adoption of virtual hearings to help with these delays. That trend has continued, as the majority of respondents said they regularly attend virtual hearings, and 40% of those asked said they actually outnumber traditional ones now. Further, video conferencing has been adopted by 90% of respondents. Opportunity to **reduce delays** by addressing **root causes**: One of the major factors that slows a case down is hearing delays. The TR survey showed that the average Judge has 58 hearings per week. And, on average 10 of those hearings (18%) were delayed. Moreover, a hearing delay has a domino effect on other cases. 77% of the judges surveyed said that the impact of a single delay impacts other cases on the docket. Implementing solutions to reduce the number of hearing delays is key to any modernization strategy. The survey further asked courts to identify the top causes for delays. The number one cause for delays was failure to appear, the number two cause was for evidentiary delays, the number three cause was clerical error, and the number four cause was legal issue. Strategies to reduce delays Offer **remote** participation **options** – In Arizona, judges and other court officials reported a notable boost in participation rates in 2020, largely due to remote access. There was an 8% year-over-year drop in automatic judgments in June of 2020 and the failure-to-appear rate for eviction proceedings in Arizona's largest county, Maricopa, dropped from close to 40% in 2019 to just around 13% in February of 2021. **Organize evidence** and legal **analysis** – A judge's time is the court's most valuable resource. It is **critical** that any **modernization** strategy includes **solutions** that shorten the **time** it takes for the judge to gain all the **requisite information** needed to confidently make a decision.

The aff opens the floodgates and overburden the courts

MacNeil '13 [Robert; September 10; Senior Lecturer at the University of Sydney; Climate Policy, "Alternative Climate Policy Pathways in the US," vol. 13] https://ideas.repec.org/a/taf/tcpoxx/v13y2013i2p259-276.html recut //cy

Title: Alternative Climate **Policy** Pathways in the US The implementation of these schemes, however, should not lead one to underestimate the immense political will that will be required to undertake such a task. Indeed, **any** administration that **attempt**ed to implement such a programme would be required to spend vast quantities of political capital on the endeavour, and would **undoubtedly** face **considerable** political and legal challenges. From the Right, the programme would be **attacked** not only for the supposed **regulatory** and **cost burdens** placed on **businesses** and **households**, but also for the nature of the strategy itself and the potentially **antidemocratic** optics of '**legislating** through the **backdoor**'. Moreover, the EPA would have to contend seriously with the **very real possibility** that Congress will attempt to **strip** the **agency** of its **authority** to regulate GHG emissions. This has occurred in the **past** in the form of **bills** and **riders** proposed by Republicans and Democrats **alike**. For example, in 2009, the Republican Senator of Alaska, Lisa Murkowski, put forth a rider on the EPA's appropriations bill for that year that would have achieved this end, and in 2010, the Democratic Senator of West Virginia, Jay Rockefeller, proposed a bill that would have suspended GHG emissions regulation for all stationary sources (Monast et al., 2010). Indeed, a **series** of **legal challenges** regarding the agency's initial **endangerment finding** and **tailoring rule** would be all but **inevitable**. Although most of these problems could be dealt

with through presidential vetoes – as indeed President Obama has done by signalling his intention to veto any attempts to remove the EPA's capacity to regulate GHGs30 – the continuity of such a rule is at risk given that the Executive Branch will eventually change hands. Still, short of a future Republican administration completely abolishing the CAA – a near-impossibility given that congressional gridlock on the environment cuts both ways, with the Democratic Party scuttling most major roll-backs proposed by the Republicans since the 1980s – such an incoming administration would find itself in a difficult position if it attempted to get rid of the programme. Indeed, if a GOP administration attempted to shirk the obligations that stem from Massachusetts v. EPA, the **f**ederal **g**overnment should expect an **endless stream** of **lawsuits** from **states** and **interest groups**. At best, it could attempt to change the EPA's endangerment finding and assert that GHGs do not, in fact, contribute to climate change. However, it would once again be sued for this and would risk a great deal of international embarrassment and derision, as it would have to cite extremely marginal 'scientific' evidence to support such a claim.

Empirics prove

Nuclear News, 01-13-2025, [Website Dedicated to updates on nuclear industry], "Last Energy, Texas, Utah allege NRC overstepping in SMR regulation," ANS, https://www.ans.org/news/2025-01-13/article-6680/last-energy-texas-utah-allege-nrc-overstepping-in-smr-regulation/, accessed 3-30-2025 //cy

Advanced nuclear reactor company Last Energy joined with two Republican state attorneys general in a **lawsuit** against the Nuclear Regulatory Commission, arguing that some microreactors should not require the commission's approval. **Utah and Texas** are the states involved in the lawsuit, which was filed December 30 in federal court in Texas. The parties' goal is to **accelerate the pace** of micro- and small modular reactor deployment in the United States by exempting some new technologies from the traditional licensing process. According to a Last Energy spokesperson, "This case will determine the threshold at which a nuclear reactor is so safe that it is below concern for federal licensing. There's no doubt that robust shielding can eliminate exposure to, and the hazards from, nuclear radiation. Congress and former NRC executive director Victor Stello Jr. have both argued for a de minimus standard, and our intent is for the courts to enforce that recommendation." An NRC spokesperson said the agency will respond through its filings with the district court. Background: The nuclear power industry is experiencing a surge of support as Americans are using more energy through the electrification of the economy. The biggest customers in the playing field are large tech companies trying to build additional data centers and support artificial intelligence growth, both power-hungry endeavors. Recent federal legislation like the ADVANCE Act won bipartisan approval in 2024 and aims to make sweeping changes in the approval process for new nuclear technology. Unlike Last Energy's lawsuit, the new policy isn't trying to cut the NRC out of the licensing process—it's trying to streamline the commission's workflow and make the review process more efficient. But some say the NRC review **should not be necessary** in all cases, pointing to an example of microreactors too small to power evan an LED lightbulb that under current rules still require complicated and costly NRC licensing, the lawsuit states. Last Energy's microreactor is designed to produce 20 MW, which is about as large as a unit can be while still categorized as "micro." The units can be scaled to meet customer demand, and Last Energy promises deployment in under 24 months. The company has issued news releases about deployment progress globally—with agreements for more than 80 units across Europe—but has yet been able to secure licensing to deploy units domestically. The states argue: "SMRs are not being constructed or operated in Texas because of prohibitive NRC regulations. . . . The NRC's unlawful and overburdensome regulations have effectively precluded Last Energy from placing SMRs in Texas and continue to stymie Last Energy's efforts," the lawsuit spells out. Utah is involved "for many of the same reasons Texas is harmed," according to the lawsuit, with the state seeing rapid population growth, increasing energy demand, and retiring baseload power sources. In October, Gov. Cox launched Operation Gigawatt, with the goal of doubling Utah's power production over the next 10 years and specifically calling out nuclear as a source to help meet the state's clean, reliable energy needs.

Mere risk of litigation decimates innovation.

Lee '21 [Jongsub; February 24; Associate Professor of Finance at Seoul National University, PhD, Finance, NYU Stern; Texas A&M University Department of Finance, "Inter-firm Patent Litigation and Innovation Competition," https://mays.tamu.edu/department-of-finance/wp-content/uploads/sites/2/2021/03/Oh.pdf]

The importance of intellectual property to firms has increased over time, and conse- quently, patent litigation has become an important means of actively protecting valuable patent intellectual properties. As these intellectual properties are essential for defining firms' product market boundaries, it is important to elucidate the potential broader impact of patent litigation on various corporate policies. For example, costly patent litigation could hurt firms' financial health, which, in turn, may deter their investment activity through financial frictions (Zingales (2002)). More indirect evidence could also include changes in firms' innovation landscape, such as expanding or narrowing the current technological scope given rising intellectual property rights disputes. In growing technological sectors, patents have become an essential input for producing goods that are competitively sold in end- product markets. Therefore, patent litigation could have a significant impact on product market dynamics through its effect on both the level and scope of subsequent innovation activities. Using novel hand-collected inter-firm patent litigation data, we examine the effects of patent litigation on firms' innovation strategies in product markets. Rather than focusing on non-practicing entity (NPE)-driven patent litigation known as "patent trolls" (e.g., Cohen, Gurun, and Kominers (2019)), we examine inter-firm patent litigation in which both the plaintiffs and defendants are practicing entities (PEs) that compete in similar (or different) product markets. In many respects, the motives of NPE patent litigation differ from those of inter-firm patent litigation. For example, NPE litigation is less likely to result in back-to-back litigation,1 while inter-firm litigation is frequently followed by subsequent lawsuits, such as the recent Samsung vs. Apple cases. Unlike patents in NPE litigation that have increasingly become unrelated to firms' core technology and products (Government Accountability Office (2013)),2 patents in inter-firm litigation tend to embed firms' key technology and amplify litigation consequences through loss of sales, disruption of product lines and subsequent product market strategy, and even corporate bankruptcy. A case in point is a series of patent disputes between Johnson & Johnson and Boston Scientific around a key technology in coronary artery stents. After a series of disputes, Boston Scientific eventually settled the cases by paying Johnson & Johnson of $1.7 billion. This was the largest sum ever paid to resolve patent litigation over a medical device and subsequently halved Boston Scientific's cash holding, curtailed the acquisition opportunities, and led to a layoff of about 1,300 em- ployees worldwide.3 Such strategic interactions between practicing entities would eventually impact industrial-organizational dynamics, which is the main focus of our paper. Using inter-firm patent litigation data between 2005 and 2011, we uncover a significant interplay between intellectual property rights' boundaries and product market dynamics. We demonstrate how innovation competition interacts with product market competition in the presence of significant litigation risk, which we instrument using China's passage of National Intellectual Property Strategy (NIPS) reform in 2008. By its nature, our study significantly differs from the studies that focus on other types of corporate litigations such as security lawsuits (Bhagat, Brickley, and Coles (1994), Bhagat, Bizjak, and Coles (1998)) that focus on the debate between a firm and its investors regarding corporate governance, managerial misconduct, and disclosure-related issues. Our sample period also differs from that of the studies in that we focus on the post-2000 time period when corporate innovation serves as a central driver of entrepreneurial growth and product market dynamics in the U.S. private sector. This differentiates our study from the literature that primarily focuses on the early period like 80's (e.g., Bhagat et al. (1994)). Building upon the theoretical notions introduced by Lanjouw and Lerner (1997), we identify legal expenses, damages awards, and the probability of winning a case as important determinants of patent litigation. Using this framework, we derive several testable impli- cations for the economics of inter-firm patent litigation. We first hypothesize that patent litigation reduces patenting activity of defendant firms as the expected cost incurred by lit- igation increases a firm's hurdle rate for innovation investments. We further predict that defendant firms are more likely to narrow down the scope of their innovation activities after litigation (i.e., more exploitative innovations rather than exploratory innovations) to reduce future litigation risk. Lastly, we expect the decrease in innovation activities and the pursuit of exploitative innovations to be more pronounced among firms with greater product market overlap due to the larger expected damages awards upon litigation. A key challenge in estimating the patent litigation effect on firms' innovation activity is that patent litigation is likely endogenous to a number of observable and unobservable factors. For example, financially weaker firms may be targeted more easily in patent lit- igation and these firms could also reduce innovation activity. To alleviate these potential endogeneity concerns, we use an instrumental variable approach. We use China's passage of NIPS in 2008 as a quasi-natural experiment that exogenously increases the U.S. firms' patent litigation risk. The strengthening intellectual property (IP) rights in China around NIPS increases sales, royalties, and licensing fees received by the U.S. firms that have already established strong operational exposure in China. The incentives to protect their IP-related profits from China imply that these firms could preemptively stop potential domestic rivals who could prey on new business opportunities that arise in China post-NIPS reform. The U.S. firms with strong presence in the Chinese product market would attempt to secure their IP boundaries against new entrants through active IP-related litigation strategies, which is the main channel through which we identify arguably more exogenously increasing litigation risk among the U.S. firms. Using this instrumental variable approach, we find that firms in the industries with Chinese market exposure prior to NIPS are more likely to be defendants in inter-firm patent litigation. We further find that such increasing patent litigation risk significantly reduces defendant firms' innovation activity by 7.5% based on the number of new patent applications by these firms. The effect is statistically significant at the 1% to 5% levels, and is consistent with our theoretical prediction that patent litigation increases the cost of innovation and discourages corporate innovation activities. These defendant firms also seem to attempt to offset the adverse litigation shock by shifting innovation strategy toward more narrow-scoped ones in order to keep the future litigation risk

lower. We empirically gauge at firms' innovation strategy using exploitative and exploratory measures developed by Gao, Hsu, and Li (2018). We find that defendant firms' innovation becomes more exploitative and **less exploratory** to avoid inter-firm **IP disputes**. Firms **increasingly** depend on the **existing patents** and technologies, while they explore less on **new knowledge** outside the firm's existing **IP** boundary. Firms' innovation activities become **significantly narrower** in scope when they face rising innovation competition. Next, we go one step further and examine whether the patent litigation effect inter- acts with product market dynamics. We decompose our litigation cases into intra- versus inter-industry cases. Based on the firms' product markets in place, we define a case as an intra-industry case if the IP dispute occurs between plaintiffs and defendants in the same three-digit standard industrial classification (SIC) code. Other cases are defined as inter-industry cases accordingly. Consistent with our theoretical prediction, we find that the negative litigation effects on corporate innovation activities strengthens in the intra-industry cases, in which greater product market overlap amplifies the damages award of inter-firm lit- igation. The litigation effects in intra-industry cases are almost four times larger than those in the inter-industry cases. We further show the robustness of our findings to the use of an alternative product market classification measure, product market fluidity, developed by Hoberg, Phillips, and Prabhala (2014). This alternative measure defines the product market rivals based on the product description overlap as reported in the firms' annual reports. Finally, we analyze broader product market implications of inter-firm patent litigation. Patents are inherently linked to product market competition as they provide monopoly rights to use, make, and sell the pertinent invention. Patent policies and patent litigation courts often consider the extended impact on market competition. Hence, we first investigate how patent litigation affects industry competition between market rivals. We use Hoberg and Phillips (2010) text-based network industry classification (TNIC) data and obtain TNIC score that measures the competitiveness of rivals based on the similarity of product descrip- tions. We find that patent litigation intensifies the competition among rivals of a defendant because patent litigation shrinks the sphere of product market competition as innovation becomes more exploitative. While rivals become more similar and competitive, the overall firm distribution in industries becomes more dispersed in size and patenting activities. In summary, we find that patent litigation appears to locally intensify the product market com- petition among "close" rivals, yet it makes firms in the industry more dispersed in innovation outcomes. Given that patent litigation reduces the overall level of innovation activity, our results suggest that increasing patent risk among practicing firms could lead to an industry structure in which Schumpeterian effect of competition could prevail (Aghion, Bloom, Blun- dell, Griffith, and Howitt, 2005). We make several important contributions to the literature on corporate innovation and product market dynamics. We expand the Non-PE patent litigation literature (Cohen et al. (2019), Mezzanotti (2019), Appel, Farre-Mensa, and Simintzi (2018)) by showing important PE dynamics within product markets as well as their change in innovation strategies. We show that inter-firm patent litigation could have motivations beyond the cash-driven incen- tives that are primarily identified for NPE trolls. In contrast to NPE trolls, PEs strategically alter their innovation strategies rather than simply reducing R&D expenditure post-litigation to stay competitive in the technological race. Our paper also extends the broader corporate litigation literature. Existing corporate litigation literature focuses on corporate fraud (e.g., Karpoff and Lott Jr. (1993), Dyck, Morse, and Zingales (2010)), shareholder litigation (e.g., Lin, Liu, and Manso (2020), Field, Lowry, and Shu (2005)), environment-related litigation (Karpoff, Lott, and Rankine (1999)), antitrust litigation (Bizjak and Coles (1995)) and general inter-firm litigation (Bhagat et al. (1994)). In contrast to corporate fraud and shareholder litigation that stems from a manage- rial agency problem, inter-firm patent litigation highlights the operating risk of firms with substantial intellectual properties. Our findings are **consistent** with those reported in Bha- gat et al. (1994) who document the **negative stock** market reaction to defendant firms after general inter-firm **litigations**. By focusing on patent litigation, we add substantial details of how firms change their innovation strategy under the fierce technological competition.4 We also show that product market overlap is key to understanding how patent litigation, especially those between practicing entities, affects their product market strategies through post-litigationinnovationstrategyshift.5 **All** these findings are **novel** additions to the general corporate litigation **literature**.

Innovation solves existential risks. Haygerdee '17

HÉigeartaigh '17 – [Hay-ger-dee] Professor @ Cambridge, PhD in Genomics from Trinity College Dublin (Sean, "Technological Wild Cards: Existential Risk and a Changing Humanity", https://www.bbvaopenmind.com/en/articles/technological-wild-cards-existential-risk-and-a-changing-humanity/, Accessed 3-7-2019)

Technological progress now offers us a vision of a remarkable future. The advances that have brought us onto an unsustainable pathway have also raised the quality of life dramatically for many, and have unlocked scientific directions that can lead us to a safer, cleaner, more sustainable world. With the right developments and applications of technology, in concert with advances in social, democratic, and distributional processes globally, progress can be made on all of the challenges discussed here. Advances in **renewable energy** and **related tech**nologies, and more **efficient energy use**—advances that are likely to be accelerated by progress in technologies such as **a**rtificial **i**ntelligence—can bring us to a point of **zero-carbon emissions**. New **manufacturing capabilities** provided by synthetic biology may provide cleaner ways of producing products and degrading waste. A greater scientific understanding of our natural world and the ecosystem services on which we rely will aid us in plotting a trajectory whereby **critical environmental systems are maintained** while allowing human flourishing. Even advances in education and women's rights globally, which will play a role in achieving a stable global population, can be aided specifically by the information, coordination, and education tools that technology provides, and more generally by growing prosperity in the relevant parts of the world. There are **catastrophic** and **existential** risks that we will simply **not be able to overcome without advances in science and technology.** These include possible **pandemic outbreaks**, whether natural or engineered. The early **identification of incoming asteroids**, and approaches to shift their path, is a topic of active research at NASA and elsewhere. While currently there are no known techniques to prevent or mitigate a **supervolcanic**

eruption, this may not be the case with the tools at our disposal a century from now. And in the longer run, a civilization that has **spread permanently beyond the earth**, enabled by advances in **spaceflight**, manufacturing, robotics, and terraforming, is one that is **much more likely to endure**. However, the breathtaking power of the tools we are developing is **not to be taken lightly**. We have been very lucky to muddle through the advent of nuclear weapons without a global catastrophe. And within this century, it is realistic to expect that we will be able to rewrite much of biology to our purposes, intervene deliberately and in a large-scale way in the workings of our global climate, and even develop agents with intelligence that is fundamentally alien to ours, and may vastly surpass our own in some or even most domains—a development that would have uniquely unpredictable consequences.

Contention 2 is BioDiversity

The NRC maintains nuclear safety now.

Goldfin 23 [Robert P. Goldfin and Jane Accomando, 12-22-2023, "NRC to Increase Focus on Appendix B Compliance in View of FY2023 Enforcement Findings," MorganLewis, https://www.morganlewis.com/blogs/upandatom/2023/12/nrc-to-increase-focus-on-appendix-b-compliance-in-view-of-fy2023-enforcement-findings, DOA: 3/30/2025] JZ + shaan

The US Nuclear Regulatory Commission (NRC) recently published its annual vendor newsletter, The Vendor Times, documenting findings of NRC vendor inspection staff and lessons learned related to the vendor inspection program. The newsletter follows the NRC's November 20 vendor inspection program self-assessment for fiscal year 2023. Through these two issuances, the NRC noted an increase in enforcement findings and indicated that it will focus on 10 CFR Part 21 and supplier oversight compliance during future inspections.

FY2023 Vendor Inspection Metrics

In fiscal year 2023, the NRC vendor inspection staff conducted 22 inspections for operating reactors, including 18 vendor inspections, one licensing audit, and three observations of Nuclear Procurement Issues Corporation audits. These compliance monitoring actions led the NRC to issue 12 notices of nonconformance (NOCs) and four notices of violation (NOVs) for eight vendors, an overall increase in the total number of findings over fiscal year 2022. None of the NOCs or NOVs were contested.

The NRC identified that this increase in NOCs and NOVs is mainly in the areas of corrective actions, 10 CFR Part 21, and supplier oversight. Therefore, the NRC stated it will focus on these areas during future inspections and stress the importance of adequately implementing correction action and 10 CFR Part 21 programs to vendors. With respect to supplier oversight, the NRC will focus on the areas of commercial-grade dedication and supplier audits.

NRC vendor inspection staff also supported 47 allegation actions during fiscal year 2023, one of which resulted in a reactive inspection.

Lessons Learned

The NRC continues to support the implementation of Inspection Procedure (IP) No. 71111.21N.03, Commercial Grade Dedication, last revised in March 2023. To that end, NRC staff supported technical process and inspection implementation training for regional inspectors, including tabletop scenario discussions, and engaged in discussions with stakeholders to provide clarity on the IP.

The NRC will carry out inspections through 2026, and each nuclear plant site will have an inspection. As of October 2023, the NRC has completed 20 inspections, identifying seven noncited violations. The NRC identified the following common themes associated with the noncited violations:

Affirming overstretches resources, killing implementation.

Gilbert 21 [Alex Gilbert, 5-15-2021, A complex systems researcher with expertise in nuclear innovation, space mining, energy markets, and climate policy. "Unlocking Advanced Nuclear Innovation: The Role of Fee Reform and Public Investment," Nuclear Innovation Alliance, https://www.nuclearinnovationalliance.org/unlocking-advanced-nuclear-innovation-role-fee-reform-and-public-investment, DOA: 3/30/2025] JZ + shaan

Due to the limited resources and flexibility, NRC was unable to proactively develop rules and perform technical activities for advanced reactors. Many of these are now being done on an adhoc basis for individual applications. The current fee model creates uncertainty for developers, customers, and investors as NRC reviews of advanced reactors can be lengthy and thus involve unexpected and open-pended licensing review costs. While the NRC regulations require fees to recover "full cost" of NRC's review, there is no way to predict what that "full cost" will be and therefore what the fees will be. In some cases, at the time that NRC accepts an application for review, it has provided an estimate of how much the fees will be. But that estimate is only an estimate. The applicant is still responsible for the full cost, regardless of the estimate.

Congress addressed some of these concerns when it passed NEIMA (See Section 2.c.). Off-fee funding in NEIMA and subsequent legislation are providing initial resources for NRC activities to build advanced reactor regulatory infrastructure. While NIA applauds these activities, expanded and more durable public resources are needed to ensure NRC remains a global leader in nuclear regulation. In addition, a more holistic review and revision to NRC's fee structure can address the underlying issues that NEIMA attempted to address.

Fees are an important consideration for commercializing advanced reactors, and nearterm licensing activities make reconsideration of licensing fees an urgent imperative. In the case of fees collected for NuScale's recent design certification, estimated upfront licensing fees were equivalent to at least 10-15 years of annual fees for operating facilities. 12 These costs could be even more significant for combined or operating license applicants who must recoup fees through revenues from a specific and limited customer base. As licensing fees occur at the beginning of the project, they require equity or debt servicing until operation commences, and can have large impacts on a project's net present value. Therefore, even though fees are only a small part of a project's lifecycle cost, they can have disproportionate impacts on early-stage projects and even discourage consideration of nuclear energy in the first place.

Today, NRC's regulatory framework for licensing reviews is largely predicated on review of large light-water reactors. To apply this framework to advanced reactors requires extensive company and staff work to identify non-applicability of regulations, exemptions, and other adaptations. This can cause initial advanced reactor reviews to take longer and cost more than historical reviews. This conflicts with the general principle of risk-informed, performancebased regulation. Advanced reactors are expected to be significantly safer than past designs, and the fees incurred should be reflective of the enhanced safety, rather than a result of inefficient requirements. Until regulations are modernized, fees pose additional undue burdens on innovators and may be costlier compared to licensing with performance-based regulatory frameworks in other countries.

That shreds oversight.

CBS 19 [CBS News, 7-17-2019, CBS News is the news division of the American television and radio broadcaster CBS. It is headquartered in New York City. "Nuclear Regulatory Commission mulls cutting back on inspections at nuclear reactors,"CBS News, https://www.cbsnews.com/news/nuclear-regulatory-commission-mulls-cutting-back-on-inspections-at-nuclear-reactors/, DOA: 3/30/2025] JZ

Washington – The staff of the Nuclear Regulatory Commission is recommending that the agency cut back on inspections at the country's nuclear reactors, a cost-cutting move promoted by the nuclear power industry but denounced by opponents as a threat to public safety.

The recommendations, made public Tuesday, include reducing the time and scope of some annual inspections at the nation's 90-plus nuclear power plants. Some other inspections would be cut from every two years to every three years.

Some of the staff's recommendations would require a vote by the commission, which has a majority of members appointed or reappointed by President Trump, who has urged agencies to reduce regulatory requirements for industries.

The nuclear power industry has prodded regulators to cut inspections, saying the nuclear facilities are operating well and that the inspections are a financial burden for power providers. Nuclear power, like coal-fired power, has been struggling in market completion against cheaper natural gas and rising renewable energy.

While Tuesday's report made clear that there was considerable disagreement among the nuclear agency's staff on the cuts, it contended the inspection reduction "improves efficiency while still helping to ensure reasonable assurance of adequate protection to the public."

Commission member Jeff Baran criticized the proposed changes Tuesday, saying reducing oversight of the nuclear power industry "would take us in the wrong direction."

"NRC shouldn't perform fewer inspections or weaken its safety oversight to save money," Baran said.

The release comes a day after Democratic lawmakers faulted the NRC's deliberations, saying they had failed to adequately inform the public of the changes under consideration.

"Cutting corners on such critical safety measures may eventually lead to a disaster that could be detrimental to the future of the domestic nuclear industry," Rep. Frank Pallone, D-N.J., chair of the House Energy and Commerce Committee, and other House Democrats said in a letter Monday to NRC Chairwoman Kristine Svinicki.

Asked for comment Tuesday, NRC spokespeople pointed to the staff arguments for the changes in the report. Trimming overall inspections "will improve effectiveness because inspectors again will be focused on issues of greater safety significance," staffers told commission members in the recommendations.

Edwin Lyman, a nuclear-power expert at the nonprofit Union of Concerned Scientists, faulted the reasoning of commission staff that the good performance of much of the nuclear power industry warranted cutting back on agency inspections for problems and potential problems.

"That completely ignores the cause-and-effect relationship between inspections and good performances," Lyman said.

Independently

Harvey **Wasserman 16**, American journalist, author, democracy activist, and advocate for renewable energy, strategist and organizer in the anti-nuclear movement in the United States for over 30 years, "How Nuclear Power Causes Global Warming", Progressive, Sept 21 2016, //RR

Supporters of nuclear power like to argue that nukes are the key to combatting climate change. Here's why **they are dead wrong.** Every nuclear generating station spews about two-thirds of the energy it burns inside its reactor core into the environment. **Only one-third is converted into electricity**. **Another tenth of that is lost in transmission.** According to the Union of Concerned Scientists: **Nuclear fission is the most water intensive method** of the principal thermoelectric generation options in terms of the amount of water withdrawn from sources. In 2008, nuclear power plants withdrew eight times as much freshwater as natural gas plants per unit of energy produced, and up to 11 percent more than the average coal plant. Every day, **large reactors like the two at Diablo Canyon, California, individually dump about 1.25 billion gallons of water into the ocean** at temperatures up to **20 degrees Fahrenheit warmer than the natural environment.** Diablo's "once-through cooling system" takes water out of the ocean and dumps it back **superheated, irradiated and laden with toxic chemicals**. Many U.S. reactors use cooling towers which emit huge quantities of steam and water vapor that also directly warm the atmosphere. These emissions are often chemically treated to prevent algae and other growth that could clog the towers. Those chemicals can then be carried downwind, along with radiation from the reactors. In addition, hundreds of thousands of birds die annually by flying into the reactor domes and towers. The Union of Concerned Scientists states: **The temperature increase in the bodies of water can have serious adverse effects on aquatic life**. Warm water holds less oxygen than cold water, thus discharge from once-through cooling systems can create a "temperature squeeze" that elevates the metabolic rate for fish. Additionally, suction pipes that are used to intake water can draw plankton, eggs and larvae into the plant's machinery, while larger organisms can be trapped against the protective screens of the pipes. Blocked intake screens have led to temporary shut downs and NRC fines at a number of plants. And that's not all. All nuclear reactors emit Carbon 14, a radioactive isotope, invalidating the industry's claim that reactors are "carbon free." And the fuel that reactors burn is carbon-intensive. The mining, milling, and enrichment processes needed to produce the pellets that fill the fuel rods inside the reactor cores all involve major energy expenditures, nearly all of it based on coal, oil, or gas. And of course there's the problem of nuclear waste. After more than a half-century of well-funded attempts, we've seen no solution for the management of atomic power's intensely radioactive waste. There's the "low-level" waste involving enormous quantities of troublesome irradiated liquids and solid trash that must be dealt with outside the standard civilian waste stream. And that handling involves fossil fuels burned in the process of transportation, management, and disposal as well As for the high-level waste, this remains one of humankind's most persistent and dangerous problems. Atomic apologists have claimed that the intensely radioactive spent fuel rods can somehow be usable for additional power generation. But after a half-century of efforts, with billions of dollars spent, all attempts to do that have utterly failed. There are zero successful reactors capable of producing more reactor fuel than they use, or able to derive more energy from the tens of thousands of tons of spent fuel rods they create. Some reactors, like Fukushima, use "mixed-oxide" fuels that have proven to be extremely dirty and expensive. It's possible some of this "MOX" fuel containing plutonium, actually fissioned at Fukushima Unit Three, raising terrifying questions about the dangers of its use. The mushroom cloud that appears on video as Fukushima Unit Three exploded stands as an epic warning against further use of these impossible-to-manage fuels. The MOX facility under construction near Aiken, South Carolina, is now projected to require another ten years to build with another ten possible after that to phase into production. U.S. Secretary of Energy Ernest Moniz said on September 13, 2016, at the Carnegie Endowment for International Peace that the mismanaged project was "impossible" to carry

out and that it could cost $30 billion to $50 billion. Even the current pro-nuclear Congress won't fully fund the project and the Department of Energy DOE continues to recommend abandoning it. There are no credible estimates of the global warming damage done by the intensely hot explosions at the four Fukushima reactors, or at Chernobyl, or at any other past and future reactor meltdowns or blowups. Atomic apologists argue that the disposal of high-level reactor wastes should be a relatively simple problem, lacking only the political will to proceed. The industry touts New Mexico's Waste Isolation Pilot Project, or WIPP, which has long been the poster child for military attempts to deal with high-level trash from the nuclear weapons program. Accepting its first shipment of waste in 1999, WIPP was touted as the ultimate high-tech, spare-no-expense model that proved radioactive waste disposal "can be done." But a series of disastrous events in February, 2014, led WIPP to stop accepting wastes—the sole function for which it was designed. Most significant was the explosion of a single barrel of highly radioactive waste materials (it was mistakenly packed with organic rather than clay-based kitty litter). About a dozen WIPP workers were exposed to potentially harmful radiation. The entire facility remains closed. In a phone interview, facility management told me it may again accept some wastes before the end of this year. But at least part of the cavernous underground labyrinth may never be reopened. The Los Angeles Times estimated the cost of this single accident at $2 billion. Overall, the idea that atomic power is "clean" or "carbon free" or "emission free" is a very expensive misconception, especially when compared to renewable energy, efficiency, and conservation. Among conservation, efficiency, solar and wind power technologies, there are no global warming analogs to the heat, carbon, and radioactive waste impacts of nuclear power. No green technology kills anywhere near the number of marine organisms that die through reactor cooling systems. Rooftop solar panels do not lose ten percent of the power they generate to transmission, as happens with virtually all centralized power generators. S. David Freeman, former head of numerous large utilities and author of All Electric America: A Climate Solution and the Hopeful Future, says: "Renewables are cheaper and safer. That argument is winning. Let's stick to it." No terrorist will ever threaten one of our cities by blowing up a solar panel. But the nuclear industry that falsely claims its dying technology doesn't cause global warming does threaten the future of our planet.

Moreover improper disposal decks diversity. FJ 23

FJ, (independent brand specializing in reusable, eco-friendly hydration products), 9-18-2023, "How does nuclear energy contribute to water pollution?," FJBottle Official Website, https://www.fjbottle.com/blogs/news/how-does-nuclear-energy-contribute-to-water-pollution, accessed 3-26-2025 //MA

Radioactive waste disposal and its impact on water systems Types and characteristics of radioactive waste **Radioactive waste produced by nuclear power plants is a major concern when it comes to water pollution. This waste includes spent fuel rods and other byproducts that contain radioactive materials. These materials can remain hazardous for thousands of years and require careful handling and disposal.** Challenges in radioactive waste disposal **Disposing of radioactive waste safely is a complex and challenging task.** The current methods involve storing the waste in specially designed facilities deep underground. However, **concerns arise due to the potential for leaks or failures in containment structures, which could lead to the release of radioactive materials into surrounding soil and water systems.** Potential risks and contamination of water sources In the event of a leak or failure in radioactive waste storage facilities, there is a risk of contamination of water sources. **This contamination can have severe consequences for human health and the environment, as radioactive materials can spread through groundwater, rivers, and other water bodies, affecting drinking water supplies and aquatic life.**

Accidents deck biodiversity.

Olsson et al. 11 [Henrik von Wehrden, Joern Fischer, Patric Brandt, Viktoria Wagner, Klaus Kümmerer, Tobias Kuemmerle, Anne Nagel, Oliver Olsson, Patrick Hostert, 12-28-2011, Chair of Material Resources, Institute of Environmental Chemistry, Leuphana University Lüneburg, Scharnhorststr, 1, 21335 Lüneburg,

Germany "Consequences of nuclear accidents for biodiversity and ecosystem services," Society for Conservation Biology, https://conbio.onlinelibrary.wiley.com/doi/full/10.1111/j.1755-263X.2011.00217.x, DOA: 3/30/2025] JZ

To characterize and quantify the potential consequences of nuclear accidents for biodiversity and ecosystem services, we reviewed 521 published studies investigating the impacts of the Chernobyl disaster, which, until now, has been the only available baseline event to empirically judge the consequences of catastrophic nuclear accidents (see online Supplementary Material for Methods). Specifically, our study aimed to (1) provide a summary of the spatial and temporal patterns of the documented effects of the Chernobyl disaster on a wide range of organisms, and (2) discuss the implications of nuclear accidents for the provision of ecosystem services, again, drawing on documented evidence in the aftermath of the Chernobyl accident. We conclude with four tangible take-home messages, intended to be directly relevant to debates about the future of nuclear energy.

Consequences or impacts to species

Spatially, the documented effects of the Chernobyl disaster broadly follow known fallout patterns (Figure 1). However, variance in radiation levels is extremely high, not only between but also within sites. At a given study location, radiation levels have been shown to vary from 44,300 to 181,100 Becquerel per kilogram (Bq/kg) for mushrooms in southern Sweden (Mascanzoni 2009), from 3,000 to 50,000 Bq/kg for bats in Chernobyl (Gashchak et al. 2010), and from 176 to 587,000 Bq/kg for higher plants in southwestern Russia (Fogh & Andersson 2001); the latter equals almost a hundred times the threshold (600 Bq/kg) set by the European Union for Food that is deemed safe for consumption. High variance in radiation levels means that fallout maps based on extrapolations, models, and climate forecasts are not sufficient to evaluate radiation levels on a fine scale—field data are critically important for this purpose. Furthermore, radiation levels measured in the field and predicted fallout patterns based on meteorological data sometimes do not match (McAulay & Moran 1989), because additional factors, such as dry deposition, are not accounted for by climatic predictors (Arvelle et al. 1990). In addition, some regions and types of ecosystems are systematically underrepresented in studies to date. For example, existing data is sparse for marine and aquatic ecosystems (Figure 1).

Although many measurements were undertaken in the aftermath of the Chernobyl accident worldwide, existing studies are greatly biased toward few taxonomic groups (Figures 2 and 3). Most studies have focused on topsoil measurements and accumulation in the plant layer, which is where radiation can be most easily measured. Despite this bias, it is clear that for most well-studied groups, greatly elevated radiation levels can occur up to thousands of kilometers away from the disaster site. For example, recorded radiation levels in mushrooms were up to 13,000 Bq/kg in Denmark in 1991 (Strandberg 2003) and up to 25690 Bq/kg in Norway in 1994 (Amundsen et al. 1996).

The consequences of elevated radiation levels in many parts of a given ecosystem remain poorly understood, but are likely substantial. For example, rats showed changes in sleep behavior after drinking water poisoned with “only” 400 Bq/l (Lestaevel et al. 2006), and onions have shown a significantly elevated rate of chromosomal aberrations at levels as low as 575 Bq/kg (Kovalchuk et al. 1998).

Although numerous studies have investigated physiological and morphological alterations in the vicinity of the Chernobyl accident site, hardly any studies have quantified the possibility of such alterations at larger distances. This could be a major shortcoming, because radiation levels are known to be greatly increased in some organisms even at large distances from the accident site (see earlier)—physiological or morphological alterations, therefore, are plausible, at least in isolated instances. Where such alterations occur, their long-term consequences on the ecosystem as a whole can be potentially profound (Kummerer & Hofmeister 2009).

The legacies of the environmental consequences of the Chernobyl accident are still prevalent today, 25 years after the event. Although many studies have shown a peak in radiation immediately after the catastrophe and then a continuous decline, radiation levels measured throughout the ecosystem are still highly elevated. For example, radiation levels in mosses (Marovic et al. 2008), soil (Copplestone et al. 2000), and glaciers (Tieber et al. 2009) have remained greatly elevated in several locations around Europe. The long-lasting legacy of the Chernobyl accident was also illustrated by intense wildfires in the Chernobyl region in 2010, which caused a renewed relocation of radioactive material to adjacent regions (Yoschenko et al. 2006). The persistence of high radiation levels can be attributed partly to the half-life rates of the chemical elements involved (e.g., 31 years for Caesium-137; 29 years for Strontium-90; and 8 days for Iodine-131).

In addition to elevated radiation levels, morphological and physiological changes are by definition long-term in nature, and can even be permanent if genetic alterations occur. For example, a range of bird species now have developed significantly smaller brains inside the core zone around the Chernobyl reactor site compared to individuals of the same species outside this zone (Møller et al. 2011). The consequences of such changes on long-term evolutionary trajectories remain largely unknown.

Lethal mutations following exposure to nuclear fallout have been observed in various plant (Abramov et al. 1992; Kovalchuk et al. 2003) and animal species (Shevchenko, et al. 1992; Zainullin et al. 1992), yet research has mainly been conducted within the Chernobyl region. Morphological changes have also been observed in a wide array of species, including plants (Tulik & Rusin 2005), damselflies (Muzlanov 2002), diptera (Williams et al. 2001), and mice (Oleksyk et al. 2004). In addition, some studies have documented.

Physiological effects, such as changes in the leukocyte level (Camplani et al. 1999) and reduced reproduction rates (Møller et al. 2008). Changes in genetic structure have been recorded in various organisms, including fish (Sugg et al. 1996) and frogs (Vinogradov & Chubinishvili 1999). More broadly, elevated radiation can negatively affect the abundance of entire species

groups, such as insects and spiders (Møller & Mousseau 2009a), raptors (Møller & Mousseau 2009b), or small mammals (Ryabokon & Goncharova 2006).

How low levels of radiation affect different species is poorly understood; studies have suggested that low levels of radiation can have a persistent influence on mutation rates in Drosophila (Zainullin et al. 1992), and can weaken immune (Malyzhev 1993) and reproductive systems (Serkiz 2003) of small mammals; but again, most studies have been restricted to the Chernobyl accident area. A more obvious measure of permanent change is widespread death of organisms living in the direct vicinity of the disaster site (Figures 1 and 2).

Food web and ecosystem impacts

In addition to effects on individual species, biological accumulation through the food web can negatively affect some species—particularly those at higher trophic levels and those depending on strongly affected food items. Bioaccumulation poses a risk to affected species because it exacerbates exposure to elevated radiation levels, and hence, leads to increased chances of physiological or morphological alterations. For example, can radiation levels in top predators remain elevated for a long time even when species at lower trophic levels show negligible radiation levels, as demonstrated for the Trench (Tinca tinca) in the Kiev Reservoir (Koulikov 1996).

Any biodiversity loss would cause cataclysmic extinction. Exeter '18

University of Exeter 18 (The University of Exeter is a public research university in Exeter, Devon, South West England, United Kingdom, Febuary 29th 2018, "Biodiversity loss raises risk of 'extinction cascades" Science Daily, https://www.sciencedaily.com/releases/2018/02/180219155019.htm#:~:text=New%20research%20shows%20that%20the,domino%20effect%20of%20further%20extinctions.&text=%22And%20because%20species%20are%20interconnected,can%20affect%20others%20as%20well. Febuary 9th 2021) /MA

The researchers, from the University of Exeter, showed there is a higher risk of extinction cascades when other species are not present to fill the "gap" created by the loss of a species. **Even if the loss of one species does not directly cause knock-on extinctions, the study shows that this leads to simpler ecological communities that are at greater risk of "run-away extinction cascades" with the potential loss of many species. With extinction rates at their highest levels ever and numerous species under threat due to human activity, the findings are a further warning about the consequences of eroding biodiversity. "Interactions between species are important for ecosystem (a community of interacting species) stability,"** said Dr Dirk Sanders, of the Centre for Ecology and Conservation at the University of Exeter's Penryn Campus in Cornwall. "And because **species are interconnected through multiple interactions, an impact on one species can affect others as well. "It has been predicted that more complex food webs will be less vulnerable to extinction cascades because there is a greater chance that other species can step in and buffer against the effects of species loss.** "In our experiment, we used communities of plants and insects to test this prediction." The researchers removed one species of wasp and found that it led to secondary extinctions of other, indirectly linked, species at the same level of the food web. This effect was much stronger in simple communities than for the same species within a more complex food web. Dr Sanders added: "**Our results demonstrate that biodiversity loss can increase the vulnerability of ecosystems to secondary extinctions which, when they occur, can then lead to further simplification causing run-away extinction cascades.**" The study, supported by France's Sorbonne Université, is published in the journal Proceedings of the National Academy of Sciences. The paper is entitled: "Trophic redundancy reduces vulnerability to extinction cascades." How extinction cascades work The loss of a predator can initiate a cascade, such as in the case of wolves, where their extinction on one mountain can cause a large rise in the number of deer. This larger number of deer then eats more plant material than they would have before. This reduction in vegetation can cause extinctions in any species that also relies on the plants, but are potentially less competitive, such as rabbits or insects.

Biodiversity loss empirically causes war. LS 09

Live Science 09 (Live Science Staff research group), Febuary 20, 2009, “Most Wars Occur in Biodiversity Hotspots, https://www.livescience.com/5315-wars-occur-biodiversity-hotspots.html

More than 80 percent of the world's major armed conflicts from 1950-2000 occurred in regions identified as the most biologically diverse and threatened places on Earth. Scientists compared major conflict zones with the Earth's 34 biodiversity hotspots identified by Conservation International (CI). The hotspots are considered top conservation priorities because they contain the entire populations of more than half of all plant species and at least 42 percent of all vertebrates, and are highly threatened. "This astounding conclusion — that the richest storehouses of life on Earth are also the regions of the most human conflict — tells us that these areas are essential for both biodiversity conservation and human well-being," said Russell A. Mittermeier, president of Conservation International (CI) and an author of the study. "Millions of the world's poorest people live in hotspots and depend on healthy ecosystems for their survival, so there is a moral obligation — as well as political and social responsibility — to protect these places and all the resources and services they provide," Mittermeier said. The finding, announced today, is published in the journal Conservation Biology. **The study found that more than 90 percent of major armed conflicts — those resulting in more than 1,000 deaths — occurred in countries that contain one of the 34 biodiversity hotspots, while 81 percent took place within specific hotspots.** A total of 23 hotspots experienced warfare over the half-century studied. Examples of the nature-conflict connection include the Vietnam War, when poisonous Agent Orange destroyed forest cover and coastal mangroves, and timber harvesting that funded war chests in Liberia, Cambodia and Democratic Republic of Congo (DRC), according to a statement released by Conservation International. In those and countless other cases, the collateral damage of war harmed both the biological wealth of the region and the ability of people to live off of it. In addition, war refugees must hunt, gather firewood or build encampments to survive, increasing the pressure on local resources, the researchers explained. More weapons means increased hunting for bush meat and widespread poaching that can decimate wildlife populations — such as 95 percent of the hippopotamus slaughtered in DRC's Virunga National Park

Contention three is terror

Nuclear facilities are safe for now.

Earnhardt et al 21 (Rebecca L Earnhardt, Research Associate with the Nuclear Security program at the Stimson Center. Her research focuses on emerging technology threats to nuclear facilities, adaptation of nuclear security plans in times of crisis, and international nuclear security governance, Brendan Hyatt, nuclear security intern at the Stimson Center, Nickolas Roth, senior director of Nuclear Materials Security at the Nuclear Threat Initiative and senior research associate at the Project on Managing the Atom at the Harvard Kennedy School’s Belfer Center for Science and International Affairs, 14 January 2021, “A threat to confront: far-right extremists and nuclear terrorism”, Bulletin of the Atomic Scientists, https://thebulletin.org/2021/01/a-threat-to-confront-far-right-extremists-and-nuclear-terrorism/, DOA 3/28/2025) ESR

Could they really pull it off? While some violent far-right extremists are clearly motivated to carry out catastrophic terrorist attacks, a question remains: Do they possess the means and opportunity to conduct an act of nuclear terrorism? There is no public evidence violent far-right extremist groups have obtained the resources or exhibited the requisite operational sophistication to carry out an act of nuclear terrorism. Many of the plots involving far-right extremists and nuclear terrorism have been poorly conceived and were unlikely to succeed. These incidents, however, likely do not provide a complete picture of the threat, because publicly accessible information on the capability of these groups is limited, creating ambiguity about their general capabilities.

Affirming drastically increase the risk of nuclear terror

Pashby 25 (Tom Pashby: contributor for the New Civil Engineer. 1/10/25, "US Government assessing risk of SMRs being used to make dirty bombs", New Civil Engineer, https://www.newcivilengineer.com/latest/us-government-assessing-risk-of-smrs-being-used-to-make-dirty-bombs-10-01-2025/ // DOA: 3/13/25)JDE

The risk of small modular reactors (SMRs) being used to provide access to materials for dirty bombs (radioactive explosive devices) is being reviewed by the US Government. The review follows the publication of a paper published in the Science journal looking at the increase in **demand for high-assay low-enriched uranium (HALEU) which can be used to fuel advanced modular reactors** (AMRs) **and SMRs.** The paper, titled The weapons potential of high-assay low-enriched uranium posited that "Recent promotion of new reactor technologies appears to disregard decades-old concerns about nuclear proliferation". Scott Kemp , Edwin S. Lyman, Mark R. Deinert, Richard L. Garwin, and Frank N. von Hippel authored the paper, which said: **"Preventing the proliferation of nuclear weapons has been a major thrust of international policymaking for more than 70 years. "Now, an explosion of interest in a nuclear reactor fue**l called high-assay low-enriched uranium (HALEU), **spurred by billions of dollars in US Government funding, threatens to undermine that system of control**. "HALEU contains between 10 and 20% of the isotope uranium-235. At 20% 235U and above, the isotopic mixture is called highly enriched uranium (HEU) and **is internationally recognised as being directly usable in nuclear weapons.** "However, the practical limit for weapons lies below the 20% HALEU-HEU threshold. "**Governments** and others promoting the use of HALEU **have not carefully considered the potential proliferation and terrorism risks** that the wide adoption of this fuel creates." The "terrorism **risks**" the paper refers to **can be understood to mean the creation of dirty bombs, which are relatively low-tech devices. Conventional explosives are used, rather than fission or fusion reactions, to spread radioactive material.** US Government responds to paper announcing review U.S. Department of Energy under secretary for nuclear security and National Nuclear Security Administration (NNSA) administrator Jill Hruby wrote a letter published on 2 January in the peer review 'eLetters' section of the academic paper published on 6 June 2024. Hruby said the paper in Science, and a subsequent debate between the authors the wider nuclear community, promoted the NNSA to respond. "Given concerns about climate change coupled with increased energy demand, nuclear energy is poised for growth," she said. "Advanced and small modular reactors (A/SMRs) using HALEU fuel are under active development "NNSA recognises that reactor type, fuel enrichment level, fuel quantity, and fuel form are important factors in evaluating proliferation risks and believes that risk-informed and adaptive approaches to the proliferation challenges inherent in nuclear energy are warranted." She continued: "NNSA has a program to support U.S. A/SMR developers on security- and safeguards-by-design and promotes best practices for nuclear energy deployment by partnering with the International Atomic Energy Agency (IAEA). "With its national laboratories, NNSA has regularly collected data and evaluated HALEU risks, and is currently finalising plans to commission a National Academies report. Although these reports are largely classified, the information is used to inform programs, develop actions, and make recommendations to stakeholders. "It is important to address proliferation concerns about HALEU and important to responsibly develop A/SMRs. NNSA commits to working with academia, industry, the public, and IAEA to do just that." On 20 January 2025, President Trump will be sworn in for a second term, at which point he will be free to replace public servants with his preferred appointees at organisations including the NNSA. HALEU not being considered in the UK's SMR competition The main focus of SMR developers in the UK is the UK Government's Great British Nuclear (GBN) SMR competition. The competition winner or winners will have the opportunity to build a fleet of SMRs with government support on siting and funding. A GBN source confirmed to NCE that none of the developers in its SMR competition – name the developers – were proposing to use HALEU. NCE has previously explored the topic of whether waste from SMRs could be used to make nuclear warheads after the Department for Energy Security and Net Zero (DESNZ) did not rule out whether it was investigating this possibility. HALEU still popular in wider SMR research Work on SMRs outside of the GBN competition continues to heat up. Last Energy UK and newcleo are both active in the UK and are pushing for micro modular reactors and advanced modular reactors respectively. King's College London research fellow Ross Peel told NCE that **HALEU continues to be popular with SMR developers and the risks faced outside of the USA are similar.** Peel has recently authored papers with King's on Insider Threat Security Considerations for Advanced and Small Modular Reactors and Nuclear Industry Views on the Security of Small Modular Reactors: Results of a pilot survey, both published in October 2024. Peel said he has been "very pro-nuclear" for years but **is working to help the industry to address his security concerns around SMRs, which he believes is "not where it should be".** Peel said: "The article in Science caused a major argument when it came out and since, and is still doing so as more people become aware of it. The American Nuclear Society, for instance, prepared a letter to Science denouncing the article and tearing down the methods used by the authors, who are all highly respected non-proliferation scholars. "**HALEU is central to the plans of many developers of novel nuclear technology because of the various benefits it offers. The potential security and proliferation risks are real**, however, and proper consideration needs to be given to these. "**The technical risks of HALEU in the UK and US are not different**, although we do have a different background level of security risk than they do, which means that those technical risks might be experienced and managed in a different way. "Both countries have well-developed nuclear security infrastructure, however, which will help to manage these risks. **A lot of concern from both countries will likely be around the export of HALEU fuel to reactors abroad, in foreign countries with less mature nuclear security and non-proliferation systems**. "**Normalising the possession and use of uranium of up to 20% U-235 means that many states who might concern the US** and/or the UK **will be able to maintain a justifiable position that is that much closer to possessing nuclear weapons, whilst non-state actors** (terrorists, criminals, and even simple disgruntled employees at nuclear sites and more) **will potentially see their way to accessing a type of**

nuclear material that they could previously almost never imagine getting hold of. "Developers should be taking seriously the increased security and proliferation risks associated with HALEU use. I would recommend this be considered from the earliest stages of reactor and fuel design – the decision to use HALEU must be based on a full consideration of all factors, including security risk and proliferation risk. "Technology designers who think about these issues throughout their design process, in an integrated way alongside safety, economics, operability and all the rest, will have the greatest chance of producing well-conceived designs that address risks effectively and produce cost-effective nuclear energy." Mixed oxide (MOX) fuel is touted by some developers like newcleo as a way of reducing the burden on society of nuclear waste by using it to fuel its own AMR design. newcleo said: "Through an innovative combination of existing and proven technologies, and by reviving a nuclear industry model based on the manufacture and multi-recycling of Mixed Oxide (Mox) fuel, newcleo aims to close the nuclear fuel cycle while safely producing clean, affordable, and practically inexhaustible energy required for low carbon economies." Peel continued: "MOX is different to HALEU. MOX is about using a mixture of uranium oxide and plutonium oxide to make the fuel (usually – other oxides can creep in too). Almost all nuclear fuel today is uranium oxide. "HALEU is to do specifically with the uranium within the uranium oxide, specifically, how much of it is uranium-235 vs uranium-238. Most reactors today operate with 2-5% uranium-235 within the overall uranium. HALEU is about moving that into a range of up to 19.999% - going to 20% would make it HEU (highly enriched uranium, which is considered to be unacceptable due to weapons-use risks). "So in theory, you could put HALEU into MOX, although no-one has proposed this as the whole point of putting plutonium in there is to replace the need for uranium-235. If you have both plutonium and HALEU in the same fuel you're effectively doing two complicated and costly processes a bit, rather than focussing on doing one process more." Anti-proliferation body says lots of **SMRs increases weapons risk** The Nuclear Information Service (NIS) describes itself as "an independent, not-for-profit research organisation" which investigates the UK's nuclear weapons programme. NIS director David Cullen said: "**This move by the NNSA is a tacit acknowledgement that warnings being raised about the proliferation risks of HALEU are not unfounded**. "I hope that some of the results of their study will be made public so that there is a greater understanding of the dangers, which are just as relevant to the UK as to the US. "We don't know very much about what would be done in the UK to mitigate the risk, as none of the SMR reactor designs have progressed very far in getting regulatory approval. "Only the Rolls-Royce SMR has passed the second stage of the Generic Design Assessment (GDA) process, which means that the Office for Nuclear Regulation have not identified any foundational problems with that design." GDA allows regulators to assess the safety, security, safeguards and environmental aspects of new reactor designs before site-specific proposals are brought forward. The GDA process assesses new nuclear power plant designs for deployment in the UK, demonstrating they can be built, operated and decommissioned in accordance with the highest standards of safety, security, safeguards and environmental protection. Cullen continued: "The second stage does assess security and safeguards (i.e. measures to prevent clandestine diversion of nuclear material), but only to identify fundamental flaws. "The third stage of the process is much more detailed. I hope the ONR will have an opportunity to draw upon the work the NNSA is undertaking. "Unfortunately, **the industry's vision for SMRs, where a much larger number of smaller reactors are deployed, substantially complicates both counter-proliferation monitoring and ensuring the security of nuclear material.** "**Design measures** might be able to counter some of the more opportunistic security threats against an individual site, but they **cannot meaningfully guard against the diversion of nuclear material by SMR operators.** "Fundamentally, **a greater number of sites and more material creates more opportunities for bad actors. There is no way to design around this basic fact**."

The NRC is woefully unprepared

GAO 24 (Government Accountability Office, independent, nonpartisan government agency within the legislative branch that provides auditing, evaluative, and investigative services for the United States Congress, September 2024, "PREVENTING A DIRTY BOMB Nuclear Regulatory Commission Has Not Taken Steps to Address Certain Radiological Security Risks", GAO, https://www.gao.gov/assets/gao-24-107014.pdf, DOA 3/28/2025) ESR

NRC has not implemented the majority of the **actions** we have **recommended that would reduce the risk of a** radiological disaster resulting from a **dirty bomb**. Specifically, **NRC has not implemented 11 out of 18 actions** we have **recommended since 2012**. These unimplemented recommendations generally fall into two categories. First, NRC has not taken action to consider socioeconomic consequences in its decision-making criteria for determining security requirements for radioactive materials. Second, **NRC has not taken** the majority of the **actions** we have **recommended to strengthen the security of category 3 quantities of radioactive materials**. As stated previously, NRC has not incorporated consideration of the socioeconomic consequences of a dirty bomb into its decision-making when assessing risk for the development of security measures. So that NRC could be better assured its requirements reflect these significant and more likely consequences, in 2019 we recommended that NRC account for socioeconomic consequences in its decision-making regarding security measures for materials that could be used in a dirty bomb.41 **NRC** disagreed and, in its comments on our 2019 report, **stated that the likelihood of a dirty bomb was low and its regulations were sufficient** to provide for the safe and secure use of radioactive materials. Officials we interviewed for this report stated that this remains NRC's position today and confirmed that NRC does not plan to implement this recommendation.

This leaves reactors vulnerable to exploitation.

Earnhardt et al 21 (Rebecca L Earnhardt, Research Associate with the Nuclear Security program at the Stimson Center. Her research focuses on emerging technology threats to nuclear facilities, adaptation of nuclear security plans in times of crisis, and international nuclear security governance, Brendan Hyatt, nuclear security intern at the Stimson Center, Nickolas Roth, senior director of Nuclear Materials Security at the Nuclear Threat Initiative and senior research associate at the Project on Managing the Atom at the Harvard Kennedy School's Belfer Center for Science and International Affairs, 14 January 2021, "A threat to confront: far-right extremists and nuclear terrorism", Bulletin of the Atomic Scientists, https://thebulletin.org/2021/01/a-threat-to-confront-far-right-extremists-and-nuclear-terrorism/, DOA 3/28/2025) ESR

Far-right narratives of nuclear terror. **The intersection between violent far-right extremist ideology and catastrophic terrorism goes back decades. In** The Turner Diaries**, a 1978 novel labeled the "bible of the racist right," the protagonists use acts of nuclear terror in service of the creation of a "white world**." Protagonists bomb nuclear installations, seize nuclear weapons, target missiles at New York City and Tel Aviv, and ultimately destroy the Pentagon in a suicidal nuclear attack.[3] **The International Centre for Counterterrorism ties the Diaries to "at least 200 murders and at least 40 terrorist attacks/hate crimes" in the last 40 years**.[4] This includes Timothy **McVeigh's 1995 bombing** of the Alfred P. Murrah Federal Building in Oklahoma City, resulting in the deaths of 168 people.[5] McVeigh, however, is not the only far-right terrorist to be inspired by the Diaries. **In 2011, violent far-right extremist Anders Breivik's terror attacks killed 77 people in Norway. Dozens of pages in his 1,500-page "manifesto" discuss the execution of different acts of nuclear terrorism**.[6] **An increasingly active generation of violent far-right extremist groups and actors have adopted an especially dangerous ideology that is compatible with an act of nuclear terror: accelerationism**.[7] **Violent far-right extremists** who adopt accelerationism **view societal collapse as inevitable and seek to hasten that collapse in service of "total revolution"—the complete destruction of the existing system of governance.**[8] **Violent far-right extremists who adopt accelerationism hope to set off a series of violent chain events, with violence begetting more violence, destabilizing society**.[9] **Indiscriminate, highly destructive acts of terror—like a nuclear attack—are therefore perfect tools to sow chaos and accelerate this societal collapse. In Siege, one of the defining theoretical works of violent far-right accelerationism, author and accelerationist leader James Mason writes that, "[White supremacists] will be the single survivor in a war against the System**, a TOTAL WAR against the System."[10] In a recent act of violent far-right extremist terrorism, Brenton Tarrant, the Australian perpetrator of the 2019 terrorist attack on Christchurch masjidain in New Zealand, wrote about accelerationism in his manifesto.[11] Groups with nuclear interests**, Inspired by the ideas of accelerationism, the modern breed of violent far-right extremism is becoming more destructive, and nuclear weapons certainly fit into this profile of catastrophic violence.** The intention to bring about a cataclysmic clash of civilizations bears resemblance to better known terrorist organizations like Al Qaeda and Aum Shinrikyo, both of which have pursued nuclear weapons. As director of intelligence and counterintelligence at the US Department of Energy, Rolf Mowatt-Larssen, once observed, "Osama bin Ladin has signaled a specific purpose for using WMD in al Qaeda's quest to destroy the global status quo, and to create conditions more conducive to the overthrow of apostate regimes throughout the Islamic world."[12] Like Al-Qaeda, **violent far-right extremists support the creation of a new society that is in line with their own ideology. One of the most notable and violent far-right extremist groups that have adopted accelerationism and operate in the United States is the Atomwaffen Division** (**AWD**).[13] The organization's name translates from German to "**the nuclear weapons division**," indicating that **its members have an explicit interest in nuclear terrorism**. Brandon Russel, a former Florida National Guard member and an AWD co-founder, is one case of an aspiring nuclear terrorist. **A heavily armed Russel and a fellow AWD member were recently arrested while in route to the Turkey Point nuclear power plant**. During the investigation officials found that Russel lived in an apartment with two AWD co-conspirators; in the apartment was a prominently placed copy of the Turner Diaries and a framed photo of Oklahoma City Bomber Timothy McVeigh. The trio stockpiled weapons and explosives with the intent to blow up, among other targets, a nuclear power plant. In their apartment, police found pipe bomb components, traces of the explosive hexamethylene triperoxide diamine, and detonators. Police also detected two radioactive materials—thorium and americium—in his bedroom.[14] **AWD was not the first far-right extremist in America to consider using radioactive or nuclear materials in a terrorist attack. Several previously documented attempts by violent far-right extremists to commit acts of radiological terror indicate a longstanding interest among far-right actors in highly destructive, non-conventional acts of terror**.[15] In 2004, National Socialist Movement member Demetrius **Van Crocker attempted to build a dirty bomb to blow up a courthouse**.[16] In 2008, James **Cummings, a white supremacist, obtained four 1-gallon containers of a mix of depleted uranium and thorium-232. He planned to use these materials to assemble a dirty bomb**.[17] In 2013, a member of the Ku Klux Klan who worked at General Electric carried out research on radiation dispersal devices, learning what level of emission was required to kill humans.[18]

A successful nuclear attack triggers war.

Hayes 18 (Peter Hayes is Director of the Nautilus Institute and Honorary Professor at the Centre for International Security Studies at the University of Sydney. “NON-STATE TERRORISM AND INADVERTENT NUCLEAR WAR,” *Nautilus Institute*, 1/18/18, https://nautilus.org/napsnet/napsnet-special-reports/non-state-terrorism-and-inadvertent-nuclear-war/) dwc 18

Conclusion We now move to our conclusion. Nuclear-armed states can place themselves on the edge of nuclear war by a combination of threatening force deployments and threat rhetoric. Statements by US and North Korea’s leaders and supporting amplification by state and private media to present just such a lethal combination. Many observers have observed that the risk of war and nuclear war, in Korea and globally, have increased in the last few years—although no-one can say with authority by how much and exactly for what reasons.//// However, states are restrained in their actual decisions to escalate to conflict and/or nuclear war by conventional deterrence, vital national interests, and other institutional and political restraints, both domestic and international. It is not easy, in the real world, or even in fiction, to start nuclear wars.[19] Rhetorical threats are standard fare in realist and constructivist accounts of inter-state nuclear deterrence, compellence, and reassurance, and are not cause for alarm per se. States will manage the risk in each of the threat relationships with other nuclear armed states to stay back from the brink, let alone go over it, as they have in the past. //// This argument was powerful and to many, persuasive during the Cold War although it does not deny the hair-raising risks taken by nuclear armed states during this period. Today, the multi-polarity of nine nuclear weapons states interacting in a four-tiered nuclear threat system means that the practice of sustaining nuclear threat and preparing for nuclear war is no longer merely complicated, but is now enormously complex in ways that may exceed the capacity of some and perhaps all states to manage, even without the emergence of a fifth tier of non-state actors to add further unpredictability to how this system works in practice. //// The possibility that **non-state actors** may **attack without advance warning** as to the time, place, and angle of attack presents another layer of uncertainty to this complexity as to how inter-state nuclear war may break out. That is, non-state actors with nuclear weapons or threat goals and capacities do not seek the same goals, will not use the same control systems, **and** will **use** radically **different organizational procedures** and systems to deliver on their threats compared with nuclear armed states. If used tactically for immediate terrorist effect, a non-state **nuclear terrorist could** violently attack nuclear facilities, exploiting any number of vulnerabilities in fuel cycle facility security, or **use actual nuclear** materials and even **warheads against** military or civilian **targets**. If a persistent, strategically oriented nuclear terrorist succeed in gaining credible nuclear threat capacities, it might take hostage one or more states or cities.//// If such an event coincides with already high levels of tension and even military collisions between the non-nuclear forces of nuclear armed states, then a non-state nuclear terrorist attack could **impel a nuclear** armed **state to escalate** its threat or even military actions **against other states, in the belief** that **this** targeted **state** may have **sponsored the non-state attack**, or was simply the source of the attack, whatever the declared identity of the attacking non-state entity. **This** outcome could **trigger** these states to go onto one or more of the pathways to inadvertent **nuclear war**, especially if the terrorist attack was on a high value and high risk nuclear facility or involved the seizure and/or use of fissile material. //// Some experts dismiss this possibility as so remote as to be not worth worrying about. Yet the history of nuclear terrorism globally and in the Northeast Asian region suggests otherwise. Using the sand castle metaphor, once built on the high tide line, sand castles may withstand the wind but eventually succumb to the tide once it reaches the castle—at least once, usually twice a day. Also, theories of organizational and technological failure point to the coincidence of multiple, relatively insignificant driving events that interact or accumulate in ways that lead the “metasystem” to fail, even if each individual component of a system works perfectly. Thus, the potential catalytic effect of a nuclear terrorist incident is not that it would of itself lead to a sudden inter-state nuclear war; but that at a time of crisis **when alert levels are** already **high**, when control systems on nuclear forces have already shifted from primary emphasis on negative to positive control, when **decision making is** already **stressed**, when **the potential for miscalc**ulation **is** already **high** due to shows of force indicating that first-use is nigh, when **rhetorical threats promising annihilation** on the one hand, or collapse of morale and weakness on the other **invite counter-vailing threats by nuclear adversaries or their allies** to gain the upper hand **in the “contest of resolve**,” and when organizational cybernetics may be in play such that purposeful actions are implemented differently than intended, **then a terrorist nuclear attack** may **shift** a coincident combination of some or all of these factors **to a threshold level where they** collectively **lead to** a **first-use decision** by one or more nuclear-armed states. If the terrorist attack is timed or happens to coincide with high levels of inter-state tension involving nuclear-armed states, then some or all of these tendencies will likely be in play anyway—precisely the concern of those who posit pathways to inadvertent nuclear war as outlined in section 2 above. //// The critical question is, just as a catalyst breaks some bonds and lets other bonds form, reducing the energy cost and time taken to achieve a chemical reaction, how would a nuclear terrorist attack at time of nuclear charged inter-state tension potentially shift the way that nuclear threat is projected and perceived in a four or five-way nuclear-prone conflict, and how might it affect the potential pathways to inadvertent nuclear war in such a system?//// Such a pervasive incremental effect is shown in Figure 6 below. Figure 6: Impact of a Terrorist Nuclear Threat or Attack on Interstate Nuclear Use Control //// Any one or indeed all of these starting nuclear control profiles may be disputed, as might the control profile at the end of the response arrow. (In Figure 6, each nuclear state responds to a terrorist nuclear attack by loosening or abandoning negative controls against unauthorized use, and shifts towards reliance mostly on positive procedural controls biased towards use). But each nuclear armed state will make its moves in response to the posited terrorist nuclear attack partly in response to its expectations as to how other nuclear armed states will perceive and respond to these moves, as well as their perception that an enemy state may have sponsored a terrorist nuclear attack—and considered together, it is obvious that they may not share a

common image of the other states' motivations and actions in this response, leading to cumulative potential for misinterpretation and rapid subsequent action, reaction, and escalation.

A2 Heg

1. NL - Trump thumps.

Schuman 25 [Michael Schuman, nonresident senior fellow in the Atlantic Council's Global China Hub, 2-18-2025, Trump Hands the World to China, Atlantic, https://www.theatlantic.com/international/archive/2025/02/foreign-policy-mistake-china/681732/ , Willie T.]

American global leadership is ending. Not because of "American decline," or the emergence of a multipolar world, or the actions of U.S. adversaries. It's ending because President Donald Trump **wants to** end it.

Just about all of Trump's policies, both at home and abroad, are **rapidly destroying** the foundation of American power. The main beneficiary will be the Chinese leader Xi Jinping, who has been planning for the moment when Washington stumbles and allows China to replace the United States as the world's superpower. That Trump is willing to hand the world over to Xi—or doesn't even realize that's what he's doing—shows that his **myopic worldview**, **admiration for autocrats**, and **self-obsession** are combining to threaten international security and, with it, America's future.

Trump is choosing to retreat even though the U.S. has its adversaries on the back foot. President Joe Biden's foreign policy was working. By supporting Ukraine's defense against Russia's invasion, Biden weakened Moscow so severely that President Vladimir Putin had to turn to North Korea for help. His backing of Israel in its war with Hamas in Gaza undercut Iran's influence in the Middle East. And Biden's strengthening of the U.S. global-alliance system pressured and unnerved China as the world's advanced democracies banded together against Xi and his plans to upset the world order.

Now Trump is voluntarily **throwing away** this hard-won leverage. The supposed master negotiator is signaling his **willingness to sacrifice Ukraine** to Russia before formal negotiations even start. Last week, U.S. Defense Secretary Pete Hegseth called a restoration of Ukraine to its borders before Russia snatched Crimea in 2014 an "unrealistic objective," indicating that the administration would accept a peace deal that allows Putin to keep part of the independent nation he invaded. Hegseth also rejected NATO membership for Ukraine—the possibility of which was Putin's pretext for invading in the first place. That wouldn't be a bad outcome for Putin after starting a brutal war and effectively losing it.

But the big winner from such a settlement will be China. Because China is Russia's most important partner, any gains that Putin can salvage from his disastrous war forwards the two dictators' global agenda. That's why Xi is egging Trump on. Beijing has reportedly proposed holding a summit between Trump and Putin to resolve the Ukraine war. Then Chinese construction companies would try to swoop in and earn a fortune rebuilding a shattered Ukraine, which Xi helped Putin destroy by supporting Russia's sanctions-plagued economy.

More than that, Xi certainly realizes that Trump's **pandering** to Putin offers Xi a chance to break up the Atlantic alliance and **entrench Chinese influence** in Europe. Vice President J. D. Vance **blasted European allies** at last week's Munich Security Conference for marginalizing extremist right-wing political parties, and Chinese Foreign Minister Wang Yi took the opportunity to present Xi as the anti-Trump. "China will surely be a factor of certainty in this multipolar system and strive to be a steadfast constructive force in a changing world," he told the attendees.

European leaders are not likely to have forgotten that Xi enabled Putin's war in Ukraine. But if Trump won't guarantee European security, Xi may well seize the opportunity to **expand Chinese power** by offering to step into the breach. Xi could make the case that he is able to rein in Putin, protect Ukraine, and preserve stability in Europe. That promise could
well be an empty one; Xi may not be willing or even able to restrain an emboldened Putin. Still, abandoned by Washington, European leaders may hold their collective noses and look to Xi to keep the peace.

China "would start replacing the U.S. in the role of keeping Russia out of the Eastern Flank," Gabrielius Landsbergis, the former Lithuanian foreign minister, recently posted on X. European Union members "in the East would be dependent on China's protection and the racketeering would spread West."

Trump is handing Xi other opportunities, too. By withdrawing from the World Health Organization and the **U**nited **N**ations **H**uman **R**ights **C**ouncil, the U.S. is clearing the field for China to make the UN system an **instrument of its global power**. **Dismantling USAID** makes China all the more **indispensable** to the developing world. Trump's bizarre plan to deport Palestinians from Gaza will be a boon to Xi in the Middle East, a region China considers vital to its interests. Even the U.S. suspension of federal financial support for electric vehicles helps Xi by hampering American automakers in a sector Beijing seeks to dominate. China may see American retrenchment as an invitation to take more aggressive actions in pursuit of its interests—in Taiwan, but also toward other U.S. allies in Asia, including Japan, South Korea, and the Philippines.

Trump apparently assumes that he can keep Xi in check with tariffs. He imposed new duties on Chinese imports earlier this month. But Xi doesn't seem particularly bothered. Beijing retaliated, but with little more than a face-saving gesture. The reciprocal tariffs covered a mere tenth of U.S. imports. Why fuss about a few shipments of stuffed toys when you can take over the world?

The damage to American global standing could be **irreparable**. The hope now is that the major democracies of Europe and Asia—France, Germany, Italy, Japan, and the United Kingdom—will stop up the power vacuum Trump is creating and keep China out of it. European leaders do not have to abide by whatever deal Trump cooks up with Putin for Ukraine. They could hold firm, continue the war, and wait for a new administration in Washington to reaffirm U.S. security commitments. But the course is risky, because erstwhile U.S. allies can't
assume that Washington will ever reestablish global leadership, or that if it does, the promises of future presidents will endure. That uncertainty may compel the allied democracies to make accommodations with China as best they can.

Trump's administration may be seeking to settle matters with Putin in order then to concentrate limited U.S. resources on confronting China. But this course may succeed only in making China more difficult to contend with, because America will be forced to do so without its traditional allies by its side.

Trust, once lost, is **difficult to restore**. Trump's premise seems to be that what happens in Europe and Asia is of little consequence to the United States. Vance invoked Catholic theology (erroneously, according to Pope Francis) to justify a hierarchy of concern that places caring for U.S. citizens ahead of the rest of the world. But what, exactly, is best for Americans?

Trump may be right that other powers should do more to take care of their own affairs. But Americans know as well as anyone that what happens in the far-flung corners of the world—whether in Europe in the 1930s and '40s or in Afghanistan at the turn of the 21st century—can and often does affect them, even dragging them into **conflicts** they do not want to fight. That doesn't mean Washington must police every dispute. But by ceding global leadership to authoritarian China, Trump is creating a world that will almost certainly be **hostile to the United States**, its prosperity, and its people.

2. US LAWS decks solvency

Freeman 18 [Madison Freeman, research associate @ Council on Foreign Relations. 7-12-2018,

"How Russia, China Use Nuclear Reactors To Win Global Influence", Defense One, https://www.defenseone.com/ideas/2018/07/china-and-russia-look-dominate-global-nuclear-pow er/149642/, doa 3-9-2025] //ALuo

In addition, U.S. nuclear exports are **severely limited** by **restrictive export laws** and an **inefficient and complicated export control process.** While maintaining nonproliferation standards is critical to safeguarding global peace, the **stringent conditions** of these agreements and export controls make U.S. technology **far less appealing** to other countries than technology from Russia or China, which comes with **fewer strings attached.** Creating hurdles for U.S. exports will not prevent the adoption of nuclear technology by interested countries, but it will **remove the United States** from a role in which it can help **guide the development** of nuclear power and monitor for proliferation concerns.

3. China exports of nuclear material is down. Willis '24 gives a litany of warrants.

Willis 24 – Matthew Willis, 5-16-2024, New Security Beat, https://www.newsecuritybeat.org/2024/05/dont-panic-us-chinas-nuclear-power-ascendancy-has-its-limi ts/

Solar and wind power are scaling massively in China, with a recent projection estimating renewable installations will nearly triple current 2030 targets. Technological advancements have helped lower costs, making both sources easier to deploy than nuclear. The buildout of nuclear has paled in comparison. Grid and power market issues complicate the picture for wind and solar. "China is struggling to enhance its grid to accommodate more renewables, whose integration can significantly increase the needed provision of ancillary servicesfor efficient power transmission and distribution," explained Cory Combs of Trivium China in an interview. This helps explain how nuclear can contribute to China's net-zero transition; off-grid reactors could power an industrial park or district heating without needing as much integration as renewables. However, nuclear will contend with improved grid integration and dispatching of renewable energy. China invests more in power transmission than the rest of the world combined. Energy storage capacity almost quadrupled in 2023. Entrenched fossil fuel interests remain, but Beijing has increasingly prioritized reforms to support renewables and establishing a unified national grid. As these grid upgrades and reforms progress, nuclear will see its comparative advantages diminish and remain a low contributorto the power mix. Inland Construction Barriers and Safety Shortfalls China imposed a moratorium on inland nuclear construction following the 2011 Fukushima accident, which impedes nuclear from hitting the 10% of power generation goal. While surveys show nuclear has public support, Chinese citizens have more negative views towards building reactors inland. "Considering current social and economic pressures, the Chinese government probably deems it too risky to lift the inland nuclear moratorium and agitate the public further," commented Philip Andrews-Speed of the Oxford Institute for Energy Studies in an interview. China's leaders are also wary of how inland construction could impact water resources. Current nuclear reactors consume billions of gallons of water annually. This makes them difficult to site in provinces like Sichuan and Yunnan, where waterways already fuel hydropower, supply thirsty industries, and are increasingly under threat due to climate-change induced droughts. Non-water-dependent reactors are largely experimental and small-scale, leaving nuclear relegated to coastal areas and limited in scope. As more non-water-dependent reactors commercialize, inland construction could become more feasible, but competition with renewables and public opinion would still be challenges. Potential nuclear accidents pose another threat to inland plans. As of 2020, the National Nuclear Safety Administration (NNSA) had only 1,100 employees, only a third of the workforce employed by the US nuclear regulator. NNSA did not meet the

State Council Research Office's recommendation of quadrupling its workforce by 2020. A strained workforce in a fast-growing sector increases risk of a serious accident which could damage public confidence and political support for nuclear. Boundaries of China's Nuclear Exports As renewable integration improves and nuclear faces various domestic obstacles, China's industry could seek to export more reactors abroad — mirroring strategies other countries employed during periods of domestic nuclear power stagnation. Nonetheless, nuclear projects have encountered hurdlesin developing countries where substantial financial support, technical oversight, and design adaptations to local conditions are often required. Moreover, China has rarely mobilized its vast financial resources to support nuclear abroad. Even ignoring prospective stagnation at home and the unlikeliness of that leading to major exports, China's nuclear sector will be preoccupied with domestic commitments for some time. These constraints, paired with the Belt and Road Initiative's focus on other energy projects and the failure of past bilateral nuclear agreements, make it unlikely China will build 30 or more reactors overseas by 2030. Beijing will finance only so many projects abroad, especially with current high debtlevels and other economic headwinds.

4. Russia exports of nuclear energy and materials declining now – Old plants closing, lack of natural resources, Ukraine

Bellona 24 – 3/13/2024 – "Rosatom's output dropped over the last year. We look at three reasons why" – Bellona, https://bellona.org/news/nuclear-issues/2024-03-rosatoms-output-dropped-over-the-last-year-we-look at-three-reasons-why#:~:text=the%20last%20year.-,We%20look%20at%20three%20reasons%20why,ice b reakers%2C%20and%20in%20foreign%20projects.

The output of **Russian nuclear power plants in 2023 decreased by 2.8%** compared to 2022. A decrease in output occurred for the first time in 10 years and only the second time in 20 years – the last one was in 2013. This seemingly purely internal event can actually tell a lot about the state of the Russian nuclear industrial giant and show several key points that are important both for Russia's neighboring countries and for the prospects of Rostom's foreign projects and its role in the global nuclear market in the next few years.

According to The Federal Service for State Statistics (Rosstat), nuclear power plant output in 2023 amounted to 217 billion kWh. This is 6.4 billion kWh less than the 2022 figure of 223.4 billion kWh, which became a record for the entire time of the Russian and Soviet nuclear industry. The output indicator of a nuclear power plant is extremely important for a state corporation that is proud of the fulfillment of important government tasks – both in state defense orders (nuclear weapons and their carriers), in the volume of transportation along the Northern Sea Route and the construction of nuclear icebreakers, and in foreign projects. In terms of electricity generation, Rosatom has also been given a task personally by Vladimir Putin – to achieve 25% of the share of nuclear energy in the country's energy balance by 2045, compared to about 18%-20% in recent years.

Therefore, the annual increase in electricity generation has always been an important indicator of which Rosatom was publicly proud. It is no coincidence that Rosatom has still not publicly announced the exact output figures for 2023, more than a month after the end of the year, since they show both a decrease in output from year to year and a decrease in the share of nuclear energy in the country's energy balance to 18.4% (it has been declining for the 4th year in a row). And in the coming years it will not be easy to even keep these indicators at their previous values.

The decline in output itself was expected for those who closely follow events in the Russian nuclear industry. And Rosatom itself, at the level of statements made by not top officials, recognized the upcoming difficulties. Commenting at the beginning of 2023 on the high output figures of 2022, First Deputy General Director for NPP operation, and since June 2023, General Director of Rosenergoatom concern (Electric Energy Division of Rosatom), Alexander Shutikov,said: "By optimizing repair campaigns and increasing the efficiency of electricity production, we were able to support until 2023 there is a constant increase in the level of production, but miracles do

not happen. The output for the next three years will be lower. We know this and are ready for it."

A2 Subs

1. **Investment now, Nikolov from April**

Boyko Nikolov (journalist and political analyst at the Bulgarian Military Industry Review), 4-10-2025, "U.S. Navy's submarine fleet faces supply chain crisis in 2025", Bulgarian Military Industry Review, https://bulgarianmilitary.com/2025/04/10/u-s-navys-submarine-fleet-faces-supply-chain-crisis-in-2025/ / /EEdoa04/13/25

The drive to increase production is no small feat, especially given the intricate engineering demands of these vessels. The Columbia-class submarines, designed to replace the aging Ohio-class fleet, represent the Navy's top priority for maintaining its nuclear deterrence. These behemoths stretch 560 feet long, displace 20,806 tons when submerged, and are engineered to carry 16 Trident II D5 ballistic missiles—each capable of delivering multiple nuclear warheads over a range exceeding 7,400 miles. Their electric-drive propulsion system, a leap forward from traditional mechanical drives, promises enhanced stealth, allowing them to glide silently beneath the waves for decades without refueling. The Navy plans to build 12 of these submarines, with the lead boat, USS District of Columbia [SSBN-826], already under construction since 2021 and slated for delivery by 2030, though delays have pushed that timeline into question. Meanwhile, the Virginia-class submarines are the Navy's multi-role workhorses, built for everything from hunting enemy subs to launching Tomahawk cruise missiles against land targets. Measuring 377 feet and displacing 7,800 tons, these fast-attack subs feature advanced sonar arrays, like the Large Aperture Bow system, and can carry up to 38 weapons, including torpedoes and missiles housed in vertical launch tubes. Since their introduction in 1998, 40 Virginia-class boats have been ordered, with production hovering around two per year since 2011. The Navy now wants to sustain that pace while adding the Columbia-class to the mix—a combined effort dubbed the "1+2" procurement rate. Achieving this, however, requires shipyards to overcome significant obstacles, from **workforce shortages to cutting-edge manufacturing demands.** At General Dynamics Electric Boat in Groton, Connecticut, and Newport News Shipbuilding in Virginia, the push is on to adapt facilities for this dual-track production. Electric Boat, the prime contractor for both programs, has poured resources into expanding its workforce, hiring thousands in recent years to meet demand. In a March 2025 statement, company president Mark Rayha emphasized the need for sustained investment, saying, "**This contract modification drives continuation of the crucial demand signal that the submarine industrial base needs to invest in the capacity and materials required to increase production volume,"** as reported by GovCon Wire. Newport News, a division of Huntington Ingalls Industries, complements this effort by constructing key sections of both submarine classes, splitting the workload to keep pace. Yet, despite these efforts, t**he Government Accountability Office noted in late 2024 that production rates for Virginia-class subs remain stuck at 1.2 boats per year, well below the desired two—a gap that threatens to widen as Columbia-class construction ramps up.** Technology is a double-edged sword in this endeavor. On one hand, innovations like robotic welding and modular construction—where massive submarine sections are built separately and then assembled—have streamlined processes that once took years of manual labor. Electric Boat has also explored 3D printing for smaller components, reducing lead times for parts that would otherwise bottleneck production. Artificial intelligence is creeping into supply chain management, too, helping predict shortages and optimize logistics across a sprawling network of suppliers. **But these advancements come with challenges. The Columbia-class's electric-drive system, for instance, relies on massive turbine generators that have faced delays, with delivery setbacks reported by the GAO pushing key milestones into 2025.** Integrating such complex systems into a hull designed to operate undetected for 42 years demands precision that even the most advanced tools can't always guarantee. Workforce issues compound these technical hurdles. The submarine industry requires highly skilled welders, machinists, and engineers—jobs that take years to master. Post-pandemic labor shortages, coupled with an aging workforce, have left shipyards scrambling. In 2025, Electric Boat reported hiring over 4,000 workers in a single year, yet retention remains a struggle as younger generations shy away from industrial trades. The Navy and industry have partnered on initiatives like the Submarine Industrial Base Workforce Development

Program, launched in 2023, to train new talent, but scaling up fast enough to meet the "1+2" target remains uncertain. A Congressional Research Service report from March 2025 warned, "Whether strategic outsourcing and SIB funding will be enough to increase the Virginia-class production rate to 2.0 boats per year by 2028… is uncertain," highlighting the precarious balance between ambition and reality. **Beyond the shipyards, the supply chain emerges as a critical vulnerability.** Building these submarines **requires rare materials like titanium and high-strength steel, sourced from a global market where competition is fierce**. In 2025, **China controls vast swathes** of rare earth elements vital for advanced electronics, while Russia remains a key supplier of titanium—a metal prized for its strength and corrosion resistance in submarine hulls. The U.S. has moved to secure domestic sources, with the Department of Defense investing in mining projects in states like Texas and Nevada, but these efforts are years from fruition. A January 2025 report from the Center for Strategic and International Studies n**oted that supply chain disruptions, exacerbated by geopolitical tensions, could delay submarine construction by months or even years if key materials dry up. Worse still, the reliance on a handful of specialized suppliers—some overseas—creates targets for cyberattacks, a threat the Pentagon has flagged as a growing concern since breaches hit defense contractors in 2023.** The stakes of this production surge extend far beyond factory floors, directly impacting America's ability to wage underwater war. Submarines have long been the Navy's ace in the hole, offering unmatched stealth and firepower. The Virginia class, with its ability to loiter undetected off hostile coasts, can disrupt enemy shipping or strike inland targets with precision. In the South China Sea, where China's navy has expanded aggressively, additional Virginia boats could tip the balance, shadowing Beijing's growing fleet of Type 096 submarines—nuclear-armed vessels estimated to displace 11,000 tons and carry 24 ballistic missiles. The Columbia-class, meanwhile, ensures the U.S. retains a credible nuclear deterrent, particularly in the Arctic, where melting ice has opened new routes for Russian Yasen-class subs, stealthy attackers with a 9,100-ton displacement and hypersonic missile capabilities. Historically, submarines have shaped naval power. During the Cold War, Ohio-class boats armed with Trident missiles formed the backbone of America's nuclear triad, while Los Angeles-class attack subs hunted Soviet counterparts beneath the Atlantic. Today's underwater battlefield is more complex, with adversaries fielding advanced sonar, underwater drones, and anti-submarine aircraft. The Virginia class counters this with acoustic quieting—its pump-jet propulsors reduce noise to near-ambient levels—while the Columbia class's 42-year lifespan ensures it can outlast emerging threats. Compared to Russia's Yasen, which boasts greater speed [35 knots submerged], or China's Type 095, a quieter but less armed attack sub, the U.S. designs prioritize versatility and endurance, traits that could prove decisive in a prolonged conflict. Globally, America's rivals aren't standing still. China's submarine fleet, numbering over 60 boats by 2025 according to the Office of Naval Intelligence, includes the Yuan-class, a diesel-electric sub with air-independent propulsion that rivals the Virginia's stealth in coastal waters. Beijing has accelerated construction at its Bohai Shipyard, aiming for a fleet of 80 subs by 2035. Russia, meanwhile, has prioritized quality over quantity, with its Yasen-M variant entering service in 2024, armed with Zircon missiles that travel at Mach 9. There's chatter in defense circles—unconfirmed but persistent—that Moscow might share submarine tech with North Korea, whose own Sinpo-class boats could soon carry ballistic missiles. Iran, too, has bolstered its underwater presence with domestically built Fateh-class subs, though they lag far behind in sophistication. Back in the U.S., the Navy's push has sparked debate. **Funding** for the "1+2" plan is **substantial**—$3.36 billion for the Columbia class and $3.615 billion for the Virginia class in Fiscal Year 2025, per a March continuing resolution reported by USNI News. Yet critics, including some in Congress, question whether shipyards can deliver. T**he Columbia program alone has ballooned to $348 billion over its lifetime**, per a 2025 19FortyFive estimate, with delays risking a gap in nuclear deterrence as Ohio-class boats retire. The AUKUS pact, which promises Australia three to five Virginia-class subs in the 2030s, adds further strain, with skeptics arguing the U.S. can't spare boats while its own fleet shrinks to 50 attack subs by 2030, down from 66 in 2015. What does this all mean for the future? The **Navy's submarine surge is a bold bid** to stay ahead in a domain where stealth and power reign supreme. If successful, it could cement U.S. undersea dominance for decades, countering China's rise and Russia's resurgence. The technological leaps—electric drives, AI logistics, modular builds—signal a new era of naval engineering, while the operational payoff could deter aggression in flashpoints like Taiwan or the Arctic. Yet the risks are real. Supply chain fragility, workforce gaps, and ballooning costs threaten to derail the effort, potentially leaving the Navy outgunned in a theater it has long ruled. As autonomous drones and hypersonic weapons redefine underwater combat, one question lingers: Can America's

industrial might keep pace with its strategic ambitions, or will this be a high-stakes gamble that falls short beneath the waves?

2. Litany of alt problems the aff doesn;t solve, Nikolov ‘25

Boyko Nikolov (journalist and political analyst at the Bulgarian Military Industry Review), 4-10-2025, "U.S. Navy’s submarine fleet faces supply chain crisis in 2025", Bulgarian Military Industry Review, https://bulgarianmilitary.com/2025/04/10/u-s-navys-submarine-fleet-faces-supply-chain-crisis-in-2025/ / /EEdoa04/13/25

The drive to increase production is no small feat, especially given the intricate engineering demands of these vessels. The Columbia-class submarines, designed to replace the aging Ohio-class fleet, represent the Navy’s top priority for maintaining its nuclear deterrence. These behemoths stretch 560 feet long, displace 20,806 tons when submerged, and are engineered to carry 16 Trident II D5 ballistic missiles—each capable of delivering multiple nuclear warheads over a range exceeding 7,400 miles. Their electric-drive propulsion system, a leap forward from traditional mechanical drives, promises enhanced stealth, allowing them to glide silently beneath the waves for decades without refueling. The Navy plans to build 12 of these submarines, with the lead boat, USS District of Columbia [SSBN-826], already under construction since 2021 and slated for delivery by 2030, though delays have pushed that timeline into question. Meanwhile, the Virginia-class submarines are the Navy’s multi-role workhorses, built for everything from hunting enemy subs to launching Tomahawk cruise missiles against land targets. Measuring 377 feet and displacing 7,800 tons, these fast-attack subs feature advanced sonar arrays, like the Large Aperture Bow system, and can carry up to 38 weapons, including torpedoes and missiles housed in vertical launch tubes. Since their introduction in 1998, 40 Virginia-class boats have been ordered, with production hovering around two per year since 2011. The Navy now wants to sustain that pace while adding the Columbia-class to the mix—a combined effort dubbed the “1+2” procurement rate. Achieving this, however, requires shipyards to overcome significant obstacles, from **workforce shortages to cutting-edge manufacturing demands.** At General Dynamics Electric Boat in Groton, Connecticut, and Newport News Shipbuilding in Virginia, the push is on to adapt facilities for this dual-track production. Electric Boat, the prime contractor for both programs, has poured resources into expanding its workforce, hiring thousands in recent years to meet demand. In a March 2025 statement, company president Mark Rayha emphasized the need for sustained investment, saying, “**This contract modification drives continuation of the crucial demand signal that the submarine industrial base needs to invest in the capacity and materials required to increase production volume,”** as reported by GovCon Wire. Newport News, a division of Huntington Ingalls Industries, complements this effort by constructing key sections of both submarine classes, splitting the workload to keep pace. Yet, despite these efforts, t**he Government Accountability Office noted in late 2024 that production rates for Virginia-class subs remain stuck at 1.2 boats per year, well below the desired two—a gap that threatens to widen as Columbia-class construction ramps up.** Technology is a double-edged sword in this endeavor. On one hand, innovations like robotic welding and modular construction—where massive submarine sections are built separately and then assembled—have streamlined processes that once took years of manual labor. Electric Boat has also explored 3D printing for smaller components, reducing lead times for parts that would otherwise bottleneck production. Artificial intelligence is creeping into supply chain management, too, helping predict shortages and optimize logistics across a sprawling network of suppliers. **But these advancements come with challenges. The Columbia-class’s electric-drive system, for instance, relies on massive turbine generators that have faced delays, with delivery setbacks reported by the GAO pushing key milestones into 2025.** Integrating such complex systems into a hull designed to operate undetected for 42 years demands precision that even the most advanced tools can’t always guarantee. **Workforce issues** compound these technical hurdles. The submarine industry requires highly skilled welders, machinists, and engineers—jobs that take years to master. **Post-pandemic labor shortages, coupled with an aging workforce**, have left shipyards scrambling. In 2025, Electric Boat reported hiring over 4,000 workers in a single year, yet retention remains a struggle as younger generations shy away from industrial trades. The Navy and industry have partnered on initiatives like the Submarine Industrial Base Workforce

Development Program, launched in 2023, to train new talent, but scaling up fast enough to meet the "1+2" target remains uncertain. A Congressional Research Service report from March 2025 warned, "Whether strategic outsourcing and SIB funding will be enough to increase the Virginia-class production rate to 2.0 boats per year by 2028… is uncertain," highlighting the precarious balance between ambition and reality. **Beyond the shipyards, the supply chain emerges as a critical vulnerability.** Building these submarines **requires rare materials like titanium and high-strength steel, sourced from a global market where competition is fierce**. In 2025, **China controls vast swathes** of rare earth elements vital for advanced electronics, while Russia remains a key supplier of titanium—a metal prized for its strength and corrosion resistance in submarine hulls. The U.S. has moved to secure domestic sources, with the Department of Defense investing in mining projects in states like Texas and Nevada, but these efforts are years from fruition. A January 2025 report from the Center for Strategic and International Studies n**oted that supply chain disruptions, exacerbated by geopolitical tensions, could delay submarine construction by months or even years if key materials dry up. Worse still, the reliance on a handful of specialized suppliers—some overseas—creates targets for cyberattacks, a threat the Pentagon has flagged as a growing concern since breaches hit defense contractors in 2023.** The stakes of this production surge extend far beyond factory floors, directly impacting America's ability to wage underwater war. Submarines have long been the Navy's ace in the hole, offering unmatched stealth and firepower. The Virginia class, with its ability to loiter undetected off hostile coasts, can disrupt enemy shipping or strike inland targets with precision. In the South China Sea, where China's navy has expanded aggressively, additional Virginia boats could tip the balance, shadowing Beijing's growing fleet of Type 096 submarines—nuclear-armed vessels estimated to displace 11,000 tons and carry 24 ballistic missiles. The Columbia-class, meanwhile, ensures the U.S. retains a credible nuclear deterrent, particularly in the Arctic, where melting ice has opened new routes for Russian Yasen-class subs, stealthy attackers with a 9,100-ton displacement and hypersonic missile capabilities. Historically, submarines have shaped naval power. During the Cold War, Ohio-class boats armed with Trident missiles formed the backbone of America's nuclear triad, while Los Angeles-class attack subs hunted Soviet counterparts beneath the Atlantic. Today's underwater battlefield is more complex, with adversaries fielding advanced sonar, underwater drones, and anti-submarine aircraft. The Virginia class counters this with acoustic quieting—its pump-jet propulsors reduce noise to near-ambient levels—while the Columbia class's 42-year lifespan ensures it can outlast emerging threats. Compared to Russia's Yasen, which boasts greater speed [35 knots submerged], or China's Type 095, a quieter but less armed attack sub, the U.S. designs prioritize versatility and endurance, traits that could prove decisive in a prolonged conflict. Globally, America's rivals aren't standing still. China's submarine fleet, numbering over 60 boats by 2025 according to the Office of Naval Intelligence, includes the Yuan-class, a diesel-electric sub with air-independent propulsion that rivals the Virginia's stealth in coastal waters. Beijing has accelerated construction at its Bohai Shipyard, aiming for a fleet of 80 subs by 2035. Russia, meanwhile, has prioritized quality over quantity, with its Yasen-M variant entering service in 2024, armed with Zircon missiles that travel at Mach 9. There's chatter in defense circles—unconfirmed but persistent—that Moscow might share submarine tech with North Korea, whose own Sinpo-class boats could soon carry ballistic missiles. Iran, too, has bolstered its underwater presence with domestically built Fateh-class subs, though they lag far behind in sophistication. Back in the U.S., the Navy's push has sparked debate. **Funding** for the "1+2" plan is substantial—$3.36 billion for the Columbia class and $3.615 billion for the Virginia class in Fiscal Year 2025, per a March continuing resolution reported by USNI News. Yet critics, including some in Congress, question whether shipyards can deliver. T**he Columbia program alone has ballooned** to $348 billion **over its lifetime**, per a 2025 19FortyFive estimate, with delays risking a gap in nuclear deterrence as Ohio-class boats retire. The **AUKUS pact,** which promises Australia three to five Virginia-class subs in the 2030s, adds further strain, with skeptics arguing the U.S. can't spare boats while its own fleet shrinks to 50 attack subs by 2030, down from 66 in 2015. What does this all mean for the future? The Navy's submarine surge is a bold bid to stay ahead in a domain where stealth and power reign supreme. If successful, it could cement U.S. undersea dominance for decades, countering China's rise and Russia's resurgence. The technological leaps—electric drives, AI logistics, modular builds—signal a new era of naval engineering, while the operational payoff could deter aggression in flashpoints like Taiwan or the Arctic. Yet the risks are real. Supply chain fragility, workforce gaps, and ballooning costs threaten to derail the effort, potentially leaving the Navy outgunned in a theater it has long ruled. As autonomous drones and hypersonic weapons redefine underwater combat, one question lingers: Can America's

industrial might keep pace with its strategic ambitions, or will this be a high-stakes gamble that falls short beneath the waves?

3. Detection tech makes sub deterrence obsolete.

Roger Bradbury (Emeritus Professor of Complex Systems Science, Crawford School of Public Policy, Australian National University) , 3-13-2023, "Progress in detection tech could render submarines useless by the 2050s. What does it mean for the AUKUS pact?," Conversation, https://theconversation.com/progress-in-detection-tech-could-render-submarines-useless-by-the-2050s-what-do e s-it-mean-for-the-aukus-pact-201187, accessed 4-13-2025 //RP

Speaking at a summit in San Diego on Monday, Prime Minister Anthony Albanese has announced a decades-long strategy to deliver the most costly defence project in Australia's history. New details of the AUKUS defence and security pact have revealed Australia will buy three second-hand US Virginia-class submarines early next decade (and potentially two more), subject to approval by US Congress. Australia will also build a fleet of eight nuclear-powered SSN-AUKUS boats at Adelaide's Osborne Naval Shipyard. The first will be delivered by 2042, with five completed by the 2050s, and construction of the remaining three going into the 2060s. It's estimated the program will cost between A$268 billion and A$368 billion over the next three decades. Make no mistake. **Modern submarines, especially nuclear-powered ones, are one of the most potent and effective weapon systems in today's world. That is, until they aren't. Our analysis shows they might soon be so easily detected they could become billion-dollar coffins**. Learn about the latest, most interesting health and science research Get the newsletter The rise in detection technologies Both the greatest strength and greatest weakness of subs is their stealth. The best are fiendishly difficult to detect. They can be nearly anywhere in the vast expanse of the world's oceans, so adversaries must protect against them everywhere. **But if subs can be detected, they become easy targets: large, slow-moving and vulnerable to attack from the surface.** Historically, submarines have provided a distinct advantage: their stealth is the result of steady improvements in counter-detection technologies throughout the Cold War. Western submarines in particular are extremely quiet. Detection technologies, which mostly focused on sound, broadly struggled to keep up. But this tide is turning. **Subs in the ocean are large, metallic anomalies that move in the upper portion of the water column. They produce more than sound. As they pass through the water, they disturb it and change its physical, chemical and biological signatures. They even disturb Earth's magnetic field – and nuclear subs unavoidably emit radiation. Science is learning to detect all these changes, to the point where the oceans of tomorrow may become "transparent". The submarine era could follow the battleship era and fade into history.**

A2 Transition

1. Transition now is fast enough

Atkinson and Gulli '25 (Will Atkinson [S.M., Technology and Policy Program, Massachusetts Institute of Technology A.B., Geosciences, Princeton University.], Chiara Gulli [MSc, Energy, Katholieke Universiteit Leuven MSc, Energy Innovation, Electrical Engineering, Kungliga Tekniska Högskolan BSc, Energy Engineering, Politecnico di Milano.], "The Energy Transition in 2025: What to Watch For," Rocky Mountain Institute, 1-08-2025, https://rmi.org/the-energy-transition-in-2025-what-to-watch-for/)//Shwillett As we enter a new year, the race between tipping points is clearer than ever. 2024 was likely the hottest year on record, raising the risk of earth system tipping points if we fail to speed up solutions. But despite warnings of a slowdown, **solutions** continue to **race** forward. As **cleantech** becomes **cheaper** than ever, **2024** saw **record uptake** in **renewable energy**, electric vehicles (**EVs**), and **more**. These **positive tipping points** are happening **worldwide** — with major progress in **China** and the **Global South**. Let's review what that means for the year ahead. **Costs falling fast**. Solar module prices fell 35 percent to 9 cents per watt; EV batteries are now below $100/kWh and often at cost parity with their fossil-fueled competition. Cleantech growing **globally**. Solar additions grew to 600 GW, EV sales climbed 25 percent, and battery storage additions nearly doubled. Changing perception. IEA **forecasts** have **improved** for cleantech and **fallen** for fossil fuels several years in a row. New year, new progress? Energy efficiency and methane are the two fastest ways to cut warming, but also the two furthest off track. From ambition to action. With national climate plans due in February, it is time to include all sectors, pollutants, and solutions — and then hit the ground running. <<<FIGURE OMITTED>>> With falling costs, be ready for a cleantech **revolution** After 2024, clean energy is cheaper than ever. Global solar module prices fell 35 percent to less than 9 cents/kWh. EV batteries saw their **best price decline** in seven years, dropping **~30–50 percent** for cathodes and 20 percent for the full battery to below $100/kWh. EVs are now at cost-of-ownership parity in the United States and purchase price parity in China — with that milestone expected around now for Europe, in 2026 for the United States, and in 2027 for India's two- and four-wheelers. Thankfully, lower cost does not mean lower quality. Take batteries: the average cell in 2024 used less than half as much nickel and cobalt as a decade ago, and **new technologies** could **double energy densities** in

the next five years. As we see improving **safety**, **charge** time, and **longevity**, **uptake** will follow and drive **down cost** in a **virtuous cycle**. <<<FIGURE OMITTED>>> Adoption is going global Cleantech uptake is more widespread than ever. Renewable energy additions grew 17 percent with a record ~600 GW of solar, ~125 GW of wind, and near-doubling of grid storage installations to ~170 GWh in 2024. Renewables now **outpace** fossil electricity **investment** by **10 to 1**, with more investment in solar than all other power sources combined. As a result, renewables are poised to overtake coal as the leading power source in 2025. This progress is truly global. As a share of electricity,**solar** and **wind** is **scaling twice as fast** in the Global **South** as in the Global **North.** Countries like Pakistan and Namibia have used Chinese solar exports to nearly double their total electricity capacity in just two years. Meanwhile, **EV** growth rose **25 percent**(and faster for trucks), with more than 16 million vehicles sold in 2024 — driven by China, which has electrified more than half of its new cars since July. Last year started with unfounded fears of a major EV sales drop — but this is the cycle every year, as all car sales tend to be lower in Q1. Naysayers may point to a similar drop in Q1 2025, but the expected annual growth is larger than ever. <<<FIGURE OMITTED>>> Advancing policy from pledges to progress **New** national **pledges** can **accelerate** change. Led by the EU, countries on five continents **redoubled** their **commitments** to a 1.5oC-aligned emissions path, while the UK pledged an 81 percent reduction by 2035 and Mexico committed to net zero by 2050. All G20 nations now have net-zero goals that could help limit warming to well below 2oC, if realized. Governments are also taking direct action to transition away from fossil fuels. Indonesia has announced plans to switch fully to renewables in the next 15 years — retiring all coal, oil, and gas power plants despite coal's current dominance. And Ethiopia became the first nation to ban imports of non-electric cars, citing efforts to clean the air and save billions of dollars in annual oil imports. Next year will be crucial. With national climate plans due in February, it is a key opportunity to include all sectors, pollutants, and solutions like energy efficiency. Then, the focus turns to implementation — including for nature, with the next UN climate conference in Brazil. Global outlooks get more **bullish** Are we doing enough to meet the 2030 targets? It depends — but, based on the latest trends, progress-as-usual would meet the 2023 goal to triple renewable energy capacity, as well as the 2024 goal for a six-fold increase in grid energy storage. And from vehicles to heat pumps to industry, annual **electrification** progress **doubled** in the past year — a **key step** for the energy **efficiency** pledge and its many benefits. Fossil fuel **emissions** appeared to rise 0.8 percent to 37.4 GtCO2 in 2024, but **multiple analyses** show that they may well **peak** and **decline** in **2025**. **Half the world** or more has **passed peak demand** for residential gas and gasoline, and **more than half** of countries are **5+ years past the peak** for fossil electricity. As a result, leading outlooks such as the International Energy Agency (IEA) have once again raised their forecasts for renewable energy and electrification, while lowering their forecasts for fossil fuels, emissions, and carbon capture. Time will tell if they do the same in 2025.

And only ev read about actual total emissions, Gaffney '25

Michael Gaffney, Ben King and John Larsen, 1-9-2025, "Preliminary US Greenhouse Gas Estimates for 2024", No Publication, https://rhg.com/research/preliminary-us-greenhouse-gas-estimates-for-2024///EEdoa04/13/25 Lower manufacturing output drove the overall decrease **in 2024** emissions, with industrial sector **emissions falling by 1.8%.** In the oil and gas sector, continued reductions in methane emissions intensity led to a 3.7% drop in emissions. Increased air and road travel partially offset these reductions, which drove up transportation sector emissions by 0.8%. Demand for electricity—led by the residential sector—also rose by 3% and was met by higher natural gas, wind, and solar generation, while coal generation saw just a slight decline. For the first time, combined solar and wind generation surpassed coal, although overall power sector emissions increased by a slight 0.2%. In the buildings sector, emissions crept up 0.4% due to slightly elevated fuel use. The modest 2024 decline underscores the urgency of accelerating decarbonization in all sectors. To meet its Paris Agreement target of a 50-52% reduction in emissions by 2030, the US must sustain an ambitious 7.6% annual drop in emissions from 2025 to 2030, a level the US has not seen outside of a recession in recent memory.

2. Alts solve for weather issues

Alsym Energy 24 – 1-26-2024, "Renewable Energy Strategies in Extreme Weather", https://www.alsym.com/blog/renewable-energy-strategies-in-extreme-weather/

There are many reasons why fossil fuel power plants are being retired and renewable energy sources are taking their place. For one, fossil fuel plants emit greenhouse gasses which contribute to climate change. And while fossil fuel power plants are flexible, reliance on a single generation source has clear drawbacks. The February 2021 freeze in Texas is a key example, where natural gas drilling and transport infrastructure failed due to unexpected frigid temperatures, taking power plants offline and leaving people without power for four days.

On the other side of the coin**, solar, wind, hydropower**, and geothermal energy sources **are decentralized examples** of renewable energy that leverage natural power but can suffer from intermittency. Solar accounted for 45% of all new electricity-generating capacity added to the U.S. grid in the first half of 2023, signaling the shift. However, when there is a higher risk of total system failure, one renewable resource may not be enough during an extreme weather event. Deploying **multiple sources that can balance each other out when fluctuations happen** has advantages. For example, **solar energy is less effective during cloudy periods, but wind turbines can continue producing power.**
As extreme weather events become more common and severe, robust energy infrastructure will be crucial for grid stability. Diverse

renewable sources and grid resilience measures are pivotal for clean energy and reliable electricity during severe storms or wildfires.

A2 Climate

1. No repurposing

Nuc Net (No quals), 10-23-2024, “Coal-To-Nuclear: The Promises And Pitfalls Of A Potential Energy Revolution”, TerraPraxis, https://www.terrapraxis.org/news-and-events/coal-to-nuclear-the-promises-and-pitfalls-of-a-potential-energy-revo lution?utm_source=chatgpt.com, accessed 4-12-2025 //RP

Coal-to-Nuclear: The Challenges The DOE notes**significant challenges in converting coal sites because only some may meet regulatory, geographic and technical requirements**. **With no precedent for coal-to-nuclear conversions, the regulatory process and Nuclear Regulatory Commission (NRC) licensing could be lengthy, adding financial strain for utilities and communities**. To address this, the Advance act, passed by the US Congress in July 2024, directs the NRC to reduce licensing fees and increase staffing to expedite reviews of new nuclear reactors. An NRC spokesperson told NucNet: “We are evaluating existing reactor licensing and oversight requirements to determine whether changes are needed to address safety, security, or environmental issues for proposed facilities at these sites. These potential changes could enhance licensing or oversight efficiency at brownfield facilities through use of past site activities”. **Reusing infrastructure also presents challenges. While transmission connections and cooling systems can be reused, other components may not meet nuclear standards**. Prof. Buongiorno said that cooling towers, water pumps, switchyards and access roads could be reused, but **key internal system components may not withstand nuclear standards because maintenance at coal plants is less rigorous, raising reliability concerns**. Additionally, while the **transition from coal to nuclear means that coal plant workers can be reskilled** to make use of their skills to meet the demands of nuclear plant operations, **significant training will be needed**. TerraPraxis points out that while job categories like electricians are similar across coal and nuclear, about a quarter of coal plant workers require extensive re-training. **“Positions in this category often require licences, certain university degrees, or a certain number of years of training,”** Murray said. Funding for coal-to-nuclear projects may also be an issue. In the US, the Inflation Reduction Act offers substantial financial incentives, including tax credits and grants, but accessing these funds requires expertise and coordination. The DOE’s Gateway for Accelerated Innovation in Nuclear (Gain) initiative, a public-private part

A2 Peak Oil

1. eak oil’s fake AND demand will peak before supply. Berman ‘25 Arthur Berman

(associate editor of the AAPG Bulletin and was a managing editor and frequent contributor to theoildrum.com. I worked 20 years for Amoco (now BP) and 22 years as consulting geologist. I have an M.S. (Geology) from the Colorado School of Mines and a B.A. (History) from Amherst College) , 2025, 2-3-2025, "Peak Oil: Requiem for a Failed Paradigm," Art Berman, https://www.artberman.com/blog/peak-oil-requiem-for-a-failed-paradigm/, accessed 4-12-2025 //RP Peak Oil was supposed to be a warning. When world production peaked, shortages, soaring prices, and economic collapse would follow. Twenty years ago, Matt Simmons made that case in Twilight in the Desert, arguing that if Saudi oil peaked, a global crisis was coming. **The Peak Oil movement ran with it, predicting an imminent decline. That didn’t happen. Peak Oil is a failed paradigm.** Why I’m Writing This In a recent post, I explained that many **widely held beliefs about Peak Oil are memes—ideas that sound credible and feel right but fall apart when tested with data**. The response was

overwhelming—plenty of questions, some pushback, and even a few angry reactions. That told me a deeper dive was needed. My goal isn't to be dismissive or negative but to clarify my views. I was an active Peak Oil advocate 15 years ago and have spent a lot of time reflecting on where we were right—and where we were wrong. Any criticism here applies equally to me. One thing is clear: **we were wrong about Peak Oil. Not the concept itself, but certainly the timing.** I still believe Peak Oil will happen—but not the way we imagined. This isn't the first time I've been wrong, and it won't be the last. But as a scientist, I believe in revisiting past ideas and challenging my own assumptions. Honest reflection is more important than sticking to outdated narratives. That's why I'm writing this—not to offend, but to be realistic—to give a once-vital model its due respect while bidding it farewell. The analysis that follows isn't an endorsement of more oil consumption. A world constrained by Peak Oil would be better for the planet—but that's not the reality playing out. Where Peak Oil Came From Peak Oil started with credibility. M. King Hubbert predicted U.S. oil production would peak around 1970—and he was right. A geologist, he applied discovery, extraction, and depletion models from mineral resources to oil, showing that production follows a bell curve—rising with discoveries, peaking at the halfway point, then declining as what remains gets harder to extract. **After the oil shocks of the 1970s, a decade of low prices and oversupply almost buried Hubbert's warnings.** But in 1998, Colin Campbell and Jean Laherrère reignited the debate in The End of Cheap Oil , warning that global production was near its peak, with lasting economic and geopolitical consequences. Their argument: Oil discoveries peaked in the 1960s. The world's largest fields were depleting. Non-OPEC production (U.S. and North Sea) would peak by 2010, making OPEC dominant. Technology could slow decline but not stop it. Governments needed to prepare for shortages and price shocks. These ideas shaped the Peak Oil movement, a loose network of scientists, analysts, and activists pushing for alternative energy and policy shifts. Inside the Peak Oil Movement I was there. I served on the Board of Directors for the Association for the Study of Peak Oil (ASPO). I knew Matt Simmons and Colin Campbell and still talk with Jean Laherrère. I was a contributor and managing editor at The Oil Drum, the online hub for Peak Oil discussions. **At its core, Peak Oil was about depletion. But it lost focus. Instead of studying the economics of supply, it became a contest to predict the exact peak date, mostly driven by people with no industry experience.** They didn't understand reserve determination, oil-field mechanics, or how investment cycles extend supply. **Most critically, Peak Oil ignored economics—supply isn't just geology; it's shaped by price and availability of capital.** Peak Oil Never Saw Shale Coming **The early 2000s were a different oil world. Conventional crude dominated supply, and shale, deepwater, and oil sands played minor roles**. The U.S. was heavily dependent on Middle East crude, and energy independence seemed impossible. If global production peaked and exporters kept more for themselves, shortages would cripple economies. Peak Oil never saw shale coming—and worse, refused to admit its impact once it did. **By 2010, fracking and horizontal drilling unlocked massive U.S. tight oil resources, reversing decades of decline**. U.S. **crude output more than doubled from 2008 to 2018**, making it the world's top producer. **Peak Oil models also ignored Canada's oil sands and Brazil's deepwater pre-salt, both of which became major supply sources. Enhanced recovery methods pushed even more oil out of old fields, delaying decline further.** Peak OII's Biggest Flaw: Geology vs Economics and Markets **The critical flaw was geological determinism—the assumption that supply was limited to known reserves plus some that probably existed, and their depletion. But oil isn't just about what's already known—it's about what can be found with different price assumptions, advancing technology, and capital investment. The 2005-2014 oil price boom proved that economics, not just geology, dictates supply, as higher prices drove a surge in investment and new production.** Markets Changed, Peak Oil Didn't Oil wasn't just about geology anymore: OPEC+ emerged as a dominant force, controlling output to balance prices. The U.S. lifted its 40-year crude export ban in 2015, reshaping global trade flows. Oil pricing was now financialized—futures trading, speculation, and hedging meant prices weren't just about physical supply and demand. The Debate Flipped: Peak Supply vs Peak Demand **Peak Oil collapsed as a useful framework. Instead of fearing a supply crunch, the question became whether demand will peak first**, driven by: Decreasing affordability of oil EVs and electrification Climate policy and decarbonization Shifts in global energy use **The world didn't run out of oil—it found new ways to produce it and is now changing how it uses it. "The dominance of road transport fuels is anticipated to decline, whilst demand growth is expected to be driven by petroleum products used in the production of plastics and fuel for residential activities and aviation."** Vitol Long Term Oil Demand Outlook (February 2025) **World oil demand is expected to reach a peak plateau in the 2030s, and then decrease back to current levels by 2040 (Figure 1). Road transport fuels are expected to decline from 45% to 40% of oil consumption by 2040. These losses will be offset by gains in aviation and petrochemical**

uses of oil. Figure 1. Vitol oil demand change by sector of outlook. Source: Vitol and Labyrinth Consulting Services, Inc. Figure 1. Vitol oil demand change by sector of outlook. Source: Vitol and Labyrinth Consulting Services, Inc. The Evidence: Oil Supply Isn't Shrinking In "Lazy Thinking: How Memes Get Oil All Wrong," I laid out the numbers: **At current consumption, there's 60 years of proven oil at today's prices—plus another 70 years that may require higher prices. Even if you cut proven reserves in half, there's still plenty of oil left to get us to the cliff toward which civilization seems headed. The idea that oil is running out isn't true—global reserves are at record highs and still keeping up with demand.** I was sent a rebuttal—Figure 2—which separates conventional crude (green) from all liquids, including NGLs, other liquids, and refinery gains (blue), predicting Peak Oil between 2019 and 2025. Unconventional oil isn't acknowledged but apparently contributes to "liquids." Figure 2 . World oil production and forecast using ASPO (Association for the Study of Peak Oil) data. Source: Jean Laherrère. Figure 2. World oil production and forecast using ASPO (Association for the Study of Peak Oil) data. Source: Jean Laherrère. But Figure 3 tells the real story. As of October 2024 EIA data, neither crude plus condensate (including unconventional oil) nor total liquids match Figure 2's decline. October crude plus condensate production was 7 mmb/d above the 2004–2011 plateau—a trend that I once considered the strongest case for Peak Oil—and is expected to exceed 10 mmb/d more by 2026. Figure 3. October world crude + condensate production was 7 mmb/d more than 2004-11 plateau. It is expected to be more than 10 mmb/d more by the end of 2026. Source: EIA & Labyrinth Consulting Services, Inc. Why Peak Oil's View is Wrong The two figures might as well come from parallel universes. The real world aligns with Figure 3, making Figure 2's Peak Oil predictions questionable. **Unconventional oil is still oil. Refineries—crude's only buyers—don't care about Peak Oil's artificial categories. They pay for oil that meets their specifications, whether it's conventional or unconventional.** Dismissing unconventional oil is like saying, "Tomato production is up, but all the growth came from greenhouses, not traditional fields, so it doesn't count," as if the tomatoes aren't the same. Paradigm Shift: Peak Oil is Obsolete Thomas Kuhn said a paradigm must solve real, recognized problems. What problems does Peak Oil solve today? That we are in big trouble as long as we ignore unconventional oil? Unconventional oil is the world's largest new source of energy since natural gas (Figure 4). Its primary consumption is equal to wind + solar + nuclear + hydro combined. **Dismissing unconventional oil or downplaying its role isn't reality—it's just defending a narrative that can no longer be supported.** Figure 4. Unconventional oil is the world's largest new source of energy since natural gas. Its primary consumption is equal to wind + solar + nuclear + hydro combined. Source: EIA, BP, IEA, FRED, OWID, World Bank & Labyrinth Consulting Services, Inc. Yes, oil production will peak someday. But inevitability doesn't make a paradigm useful. We all know we'll die, but that fact alone doesn't shape reality. Kuhn warned that paradigms don't die easily. Copernicus had to fight Ptolemy's theories, Einstein had to push past Newton's world view, and it took plate tectonics 75 years to finally overturn the static Earth model. Peak Oil got lost when shale rewrote the script. **Technology, capital, and price—not just geology—now dictate oil supply**. The 2005-2014 price boom unlocked more oil than anyone expected. Today, financial markets and geopolitics—not depletion—drive the oil game. **Shale changed everything, unleashing a massive new supply. Peak Oil still pretends it doesn't exist—won't even put it on a chart.** That's why it's a dying paradigm. It had its moment and reshaped my world view in important ways. May it rest in peace.