# Awty International ZZ --- King Round Robin --- NEG vs. Delbarton AX

## 1NC

### 1NC --- Transmission

**Construction of new transmission lines is low.**

**Slayter 24** [Chloe; July 30th; Communications Manager for Americans for a Clean Energy Grid; “Americans for a Clean Energy Grid and Grid Strategies Release New Report on Declining Large-Scale Transmission Construction in the U.S.”; Americans for a Clean Energy Grid; https://www.cleanenergygrid.org/fewer-new-miles-2024/] cameron

The new report reveals a contrast between **transmission spending** and the **dwindling expansion** of **new infrastructure**, posing significant challenges to the nation’s energy future.

Key findings from the report include:

**Construction** of new **h**igh-**v**oltage **t**ransmission in the U.S. has **slowed** to a **trickle** over the past decade, with only **55** new miles built in 2023.

Projected load growth has doubled in the last year, and serving that load will require expanded transmission capacity.

Despite this **decline** in new **construction**, annual **transmission spend** has **risen** to more than **$25 billion** in 2023. **Ninety percent** of this spend is driven by **reliability upgrades** and the **replacement** of aging equipment, which **does not increase** delivery **capacity**.

The U.S. only builds **20%** as much new transmission in the 2020s as it did a decade ago in the first half of the 2010s.

This trend began over a **decade** ago, when the average of **1,700** miles of new **h**igh-**v**oltage **t**ransmission miles per year from 2010 to 2014 dropped to only **925** miles from 2015 to 2019, and has fallen further to an average of **350** miles per year from 2020 to 2023.

**Affirming necessitates new transmission lines.**

**Miet 24** [Hannah; October 14th; Founding Editor of The Red Deal, Commercial Real Estate Reporter for Urban Land; “Nuclear Power Makes a Comeback as Data Centers Adapt to Rising Power Demands”; Urban Land; https://urbanland.uli.org/resilience-and-sustainability/nuclear-power-makes-a-comeback-as-data-centers-adapt-to-rising-power-demands] cameron

Regulatory challenges

In the U.S., **regulatory barriers** can **prevent** green **solutions** from **scaling**. Utility **grids** are **not connected**, and **renewable plants** often exist **far** from **population centers**. Connecting them **requires new transmission lines**, but the **process** of getting them is **plagued** by **lengthy schedules** and **delays**, according to Daniel Crosby, CEO of Legend Energy Advisors.

**That triggers permanent deforestation.**

**Williams 03** [Dr. James H.; October 3rd; Professor of Applied Mechanics in the Mechanical Engineering Department at the Massachusetts Institute of Technology, Ph.D. in Engineering from the University of Cambridge; “International Best Practices for Assessing and Reducing the Environmental Impacts of High-Voltage Transmission Lines”; Nautilus Institute; https://www.nautilus.org/wp-content/uploads/2015/06/Env\_Best\_Practices\_Williams\_final.pdf] cameron

**Transmission line construction** and maintenance can lead to the **permanent removal** of woody vegetation and in some cases to the **complete conversion** of strips of **forest** ecosystem into **bare land** or land covered by completely different vegetation communities. Fragmentation, **pesticide use**, and **invasive plant species** within the right-of-way can also affect **surrounding forest areas**.

**It’s uniquely disruptive.**

**Biasotto 18** [Dr. Larissa D.; July; Ph.D. in Ecology from the University of Rio Grande; “Power lines and impacts on biodiversity: A systematic review”; Environmental Impact Assessment Review; Vol. 71; pp. 110-119; https://www.sciencedirect.com/science/article/abs/pii/S0195925517304432] cameron

\*RoW = Right of Way

The **increasing need** for **access** to **energy demands** the **installation** of **new transmission lines** (TLs). According to the International Energy Outlook 2016 (IEO, 2016), there is a predicted growth of approximately 48% on energy consumption over the next 26 years worldwide, with a consequent large expansion of the transmission system.

Due to the long distances between power plants and main consumption regions, electricity reaches consumers by an extensive network of transmission (**h**igh-**v**oltage) and distribution (low-voltage) lines. **T**ransmission **lines** differ from **distribution** lines by supporting higher voltages (from 69 kV to 800 kV), and usually extending for longer distances.

Transmission lines might cause **significant impacts** on the environment both during the **construction** and **operation** phases (Bagli et al., 2011). The most obvious impacts of power lines on the environment are associated with the right of way (RoW), the zone below the cables where vegetation is cleared and managed to avoid interference and risk to line structures and/or to energy transmission. **The RoW width** varies according to many factors (Weedy, 1989), **being wider** for lines with higher voltages. Although the disturbed area is limited in width, the linear **disturbance** may extend for **hundreds of kilometers** (e.g. Cardoso Junior et al., 2014).

**North America is key.**

**Skene 21** [Jennifer Skene, Natural Climate Solutions Policy Manager, International Program at the NRDC, Visiting Clinical Lecturer in Law at Yale Law School, JD from Yale Law School, “Our Climate Future Is Rooted in North America’s Forests”, https://www.nrdc.org/bio/jennifer-skene/our-climate-future-rooted-north-americas-forests]

**Forest protection**, once the “forgotten” climate solution, has become an integral pillar of **climate** discussions. But while attention has largely focused on forests like those of the Amazon and Indonesia, the climate doesn’t hinge just on what happens in the **tropics**. It also depends on the **boreal**; the temperate rainforests of the **Pacific**; the conifer forests of the **Rockies**; the **Northeastern coastal** forests; the **Southern wetland** forests. These forests in **North America** are being lost or stripped of carbon rich mature trees right under our noses and need to remain **standing and intact** if we are going to achieve a climate-**safe**, **sustainable future.** As the Biden administration looks to act on its historic commitment to reducing U.S. greenhouse gas emissions by at least 50% by 2030, it needs to embrace a bold new vision for forest protection that looks at how we can protect the climate-critical forest resources in our own backyard.

**North America’s forests**, the homelands of Indigenous communities and havens of rich biodiversity, are some of the most **carbon-dense areas** on **Earth**. These forests are part of the **global** forest **respiratory system** that, each year, absorbs one-third of human-caused greenhouse gas emissions. They are also gatekeepers of **vast stores of carbon** locked **safely** out of the atmosphere in their soils and biomass. The Canadian boreal forest alone stores twice as much carbon as the world’s oil reserves, while U.S. forests collectively absorb the equivalent of about **12 percent of the nation’s annual carbon pollution**. **Their sentry** stands between **us** and **climate catastrophe.**

**Climate change is existential.**

**Kemp et al. 22** [Luke Kemp et al, PhD in political science and international relations + climate expert and researcher @ Centre for the Study of Existential Risk, Climate Endgame: Exploring Catastrophic Climate Change Scenarios, Centre for the Study of Existential Risk at University of Cambridge; Proceedings of the National Academy of Sciences, Vol. 119, No. 34, https://www.pnas.org/doi/pdf/10.1073/pnas.2108146119] recut BZ

The Potential for Climate Catastrophe

There are four key reasons to be concerned over the potential of a global climate catastrophe. First, there are warnings from history. Climate change (either regional or global) has played a role in the collapse or transformation of numerous previous societies (37) and in **each of the five** mass **extinction** events in Phanerozoic Earth history (38). The current carbon pulse is occurring at an unprecedented geological speed and, by the end of the century, may surpass thresholds that triggered previous mass extinctions (39, 40). The worst-case scenarios in the IPCC report project temperatures by the 22nd century that last prevailed in the Early Eocene, reversing 50 million years of cooler climates in the space of two centuries (41).

This is particularly alarming, as human societies are locally adapted to a **specific climatic niche**. The rise of large-scale, urbanized agrarian societies began with the shift to the stable climate of the Holocene ∼12,000 y ago (42). Since then, human population density peaked within a narrow climatic envelope with a mean annual average temperature of ∼13 °C. Even today, the most economically productive centers of human activity are concentrated in those areas (43). The cumulative impacts of warming may **overwhelm societal adaptive capacity**.

Second, climate change could directly trigger **other catastrophic risks**, such as international **conflict**, or exacerbate infectious **disease spread**, and **spillover** risk. These could be potent extreme **threat multipliers**.

Third, climate change could exacerbate **vulnerabilities** and cause multiple, **indirect stresses** (such as **economic damage**, **loss of land**, and **water and food** **insecurity**) that coalesce into **system-wide synchronous** failures. This is the path of systemic risk. Global crises tend to occur through such reinforcing “synchronous failures” that spread across countries and systems, as with the 2007–2008 global financial crisis (44). It is plausible that a sudden shift in climate could trigger systems failures that unravel societies **across the globe**.

The potential of systemic climate risk is marked: The most **vulnerable** states and communities will continue to be the **hardest hit** in a warming world, exacerbating inequities. Fig. 1 shows how projected population density intersects with extreme >29 °C mean annual temperature (MAT) (such temperatures are currently restricted to only 0.8% of Earth’s land surface area). Using the medium-high scenario of emissions and population growth (SSP3-7.0 emissions, and SSP3 population growth), by 2070, around **2 billion** people are expected to live in these extremely hot areas. Currently, only 30 million people live in hot places, primarily in the Sahara Desert and Gulf Coast (43).

<<Figure 1. Omitted>>

Extreme temperatures combined with high humidity can negatively affect outdoor worker productivity and yields of major cereal crops. These deadly heat conditions could significantly affect populated areas in South and southwest Asia(47).

Fig. 2 takes a political lens on extreme heat, overlapping SSP3-7.0 or SSP5-8.5 projections of >29 °C MAT circa 2070, with the Fragile States Index (a measurement of the instability of states). There is a striking overlap between currently vulnerable states and future areas of extreme warming. If current **political fragility** does not improve significantly in the coming decades, then a belt of instability with potentially serious ramifications could occur.

<<Figure 2. Omitted>>

Finally, climate change could irrevocably undermine humanity’s ability to recover from **another cataclysm**, such as nuclear war. That is, it could create significant latent risks (Table 1): Impacts that may **be manageable during times of stability** become dire when responding to and recovering from catastrophe. These different causes for catastrophic concern are **interrelated** and must be examined together.

Defining the Key Terms

Although bad-to-worst case scenarios remain underexplored in the scientific literature, statements labeling climate change as catastrophic are not uncommon. UN Secretary-General Antonio Guterres called climate change an “existential threat.” Academic studies have warned that warming above 5°C is likely to be “beyond catastrophic” (50), and above 6°C constitutes “an indisputable global catastrophe” (9).

Current discussions over climate catastrophe are undermined by unclear terminology. The term “catastrophic climate change” has not been conclusively defined. An existential risk is usually defined as a risk that cause an enduring and significant loss of long-term human potential (51, 52). This existing definition is deeply ambiguous and requires societal discussion and specification of long-term human values (52). While a democratic exploration of values is welcome, it is not required to understand pathways to human catastrophe or extinction (52). For now, the existing definition is not a solid foundation for a scientific inquiry.

We offer clarified working definitions of such terms in Table 1. This is an initial step toward creating a lexicon for global calamity. Some of the terms, such as what constitutes a “plausible” risk or a “significant contributor,” are necessarily ambiguous. Others, such as thresholding at 10% or 25% of global population, are partly arbitrary (10% is intended as a marker for a precedented loss, and 25% is intended as an unprecedented decrease; see SI Appendix for further discussion). Further research is needed to sharpen these definitions. The thresholds for global catastrophic and decimation risks are intended as general heuristics and not concrete numerical boundaries. Other factors such as morbidity, and cultural and economic loss, need to be considered.

We define risk as the probability that exposure to climate change impacts and responses will result in adverse consequences for human or ecological systems. For the Climate Endgame agenda, we are particularly interested in catastrophic consequences. Any risk is composed of four determinants: hazard, exposure, vulnerability, and response (3).

We have set global warming of 3 °C or more by the end of the century as a marker for extreme climate change. This threshold is chosen for four reasons: Such a temperature rise well exceeds internationally agreed targets, all the IPCC “reasons for concern” in climate impacts are either “high” or “very high” risk between 2 °C and 3 °C, there are substantially heightened risks of self-amplifying changes that would make it impossible to limit warming to 3 °C, and these levels relate to far greater uncertainty in impacts.

<<Table 1. Omitted>>

Key Research Thus Far

The closest attempts to directly study or comprehensively address how climate change could lead to human extinction or global catastrophe have come through popular science books such as The Uninhabitable Earth (53) and Our Final Warning (10). The latter, a review of climate impacts at different degrees, concludes that a global temperature rise of 6 °C

We know that health risks worsen with rising temperatures (54). For example, there is already an increasing probability of multiple “breadbasket failures” (causing a food price shock) with higher temperatures (55). For the **top** four maize-producing regions (accounting for 87% of maize production), the likelihood of production losses greater than 10% jumps from 7% annually under a 2 °C temperature **rise to 86%** under 4 °C (56). The IPCC notes, in its Sixth Assessment Report, that 50 to 75% of the global population could be exposed to life-threatening climatic conditions by the end of the century due to extreme heat and humidity (6). SI Appendix provides further details on several key studies of extreme climate change.

The IPCC reports synthesize peer-reviewed literature regarding climate change, impacts and vulnerabilities, and mitigation. Despite identifying 15 tipping elements in biosphere, oceans, and cryosphere in the Working Group 1 contribution to the Sixth Assessment Report, many with irreversible thresholds, there were very few publications on catastrophic scenarios that could be assessed. The most notable coverage is the Working Group II “reasons for concern” syntheses that have been reported since 2001. These syntheses were designed to inform determination of what is “dangerous anthropogenic interference” with the climate system, that the UNFCCC aims to prevent. The five concerns are unique and threatened ecosystems, frequency and severity of extreme weather events, global distribution and balance of impacts, total economic and ecological impact, and irreversible, large-scale, abrupt transitions. Each IPCC assessment found greater risks occurring at lower increases in global mean temperatures. In the Sixth Assessment Report, all five concerns were listed as very high for temperatures of 1.2 °C to 4.5 °C. In contrast, only two were rated as very high at this temperature interval in the previous Assessment Report (6). All five concerns are now at “high” or “very high” for 2 °C to 3 °C of warming (57).

A Sample Research Agenda: Extreme Earth System States, Mass Mortality, Societal Fragility, and Integrated Climate Catastrophe Assessments

We suggest a research agenda for catastrophic climate change that focuses on four key strands:

• Understanding extreme climate change dynamics and impacts in the long term

• Exploring climate-triggered pathways to mass morbidity and mortality

• Investigating social fragility: vulnerabilities, risk cascades, and risk responses

• Synthesizing the research findings into “integrated catastrophe assessments”

Our proposed agenda learns from and builds on integrated assessment models that are being adapted to better assess large-scale harms. A range of tipping points have been assessed (58–60), with effects varying from a 10% chance of doubling the social cost of carbon (61) up to an eightfold increase in the optimal carbon price (60). This echoes earlier findings that welfare estimates depend on fat tail risks (31). Model assumptions such as discount rates, exogenous growth rates, risk preferences, and damage functions also strongly influence outcomes.

There are large, important aspects missing from these models that are highlighted in the research agenda: longer-term impacts under extreme climate change, pathways toward mass morbidity and mortality, and the risk cascades and systemic risks that extreme climate impacts could trigger. Progress in these areas would allow for more realistic models and damage functions and help provide direct estimates of casualties (62), a necessary moral noneconomic measure of climate risk. We urge the research community to develop integrated conceptual and semiquantitative models of climate catastrophes.

Finally, we invite other scholars to revise and improve upon this proposed agenda.

Extreme Earth System States. We need to understand potential long-term states of the Earth system under extreme climate change. This means mapping different “Hothouse Earth” scenarios (21) or other extreme scenarios, such as alternative circulation regimes or large, irreversible changes in ice cover and sea level. This research will require consideration of long-term climate dynamics and their impacts on other planetary-level processes. Research suggests that previous mass extinction events occurred due to threshold effects in the carbon cycle that we could cross this century (40, 63). Key impacts in previous mass extinctions, such as ocean hypoxia and anoxia, could also escalate in the longer term (40, 64).

Studying potential tipping points and irreversible “committed” changes of ecological and climate systems is essential. For instance, modeling of the Antarctic ice sheet suggests there are several tipping points that exhibit hysteresis (65). Irreversible loss of the West Antarctic ice sheet was found to be triggered at ∼2 °C global warming, and the current ice sheet configuration cannot be regained even if temperatures return to present-day levels. At a 6 °C to 9 °C rise in global temperature, slow, irreversible loss of the East Antarctic ice sheet and over 40 m of sea level rise equivalent could be triggered (65). Similar studies of areas such as the Greenland ice sheet, permafrost, and terrestrial vegetation would be helpful. Identifying all the potential Earth system tipping elements is crucial. This should include a consideration of wider planetary boundaries, such as biodiversity, that will influence tipping points (66), feedbacks beyond the climate system, and how tipping elements could cascade together (67).

Mass Morbidity and Mortality. There are many potential contributors to climate-induced morbidity and mortality, but the “four horsemen” of the climate change end game are likely to be **famine** and **undernutrition**, **extreme weather** events, **conflict**, and vector-borne **diseases**. These will be worsened by additional risks and impacts such as mortality from **air pollution** and **sea level** rise.

These pathways require further study. Empirical estimates of even direct fatalities from heat stress thus far in the United States are systematically **underestimated** (68). A review of the health and climate change literature from 1985 to 2013 (with a proxy review up to 2017) found that, of 2,143 papers, only 189 (9%) included a dedicated discussion of more-extreme health impacts or systemic risk (relating to migration, famine, or conflict) (69). Models also rarely include adaptive responses. Thus, the overall mortality estimates are uncertain. How can potential mass morbidity and mortality be better accounted for? 1) Track compound hazards through bottom-up modeling of systems and vulnerabilities (70) and rigorously stress test preparedness (71). 2) Apply models to higher-temperature scenarios and longer timelines. 3) Integrate risk cascades and systemic risks (see the following section) into health risk assessments, such as by incorporating morbidity and mortality resulting from a climate-triggered food price shock.

How can potential mass morbidity and mortality be better accounted for? 1) Track compound hazards through bottom-up modeling of systems and vulnerabilities (70) and rigorously stress test preparedness (71). 2) Apply models to higher-temperature scenarios and longer timelines. 3) Integrate risk cascades and systemic risks (see the following section) into health risk assessments, such as by incorporating morbidity and mortality resulting from a climate-triggered food price shock.

Societal Fragility: Vulnerabilities, Risk Cascades, and Risk Responses. More-complex risk assessments are generally more realistic. The determinants of risk are not just hazards, vulnerabilities, and exposures, but also responses (3, 72). A complete risk assessment needs to consider climate impacts, differential exposure, systemic vulnerabilities, responses of societies and actors, and the knock-on effects across borders and sectors (73), potentially resulting in systemic crises. In the worst case(s), a **domino** effect or spiral could continuously worsen the initial risk.

Societal risk cascades could involve conflict, disease, political change, and economic crises. Climate change has a complicated relationship with conflict, including, possibly, as a risk factor (74) especially in areas with **preexisting ethnic conflict** (75). Climate change could affect the spread and transmission of infectious diseases, as well as the **expansion and severity of different zoonotic infections** (76), creating conditions for **novel** outbreaks and infections (6,77). Epidemics can, in turn, trigger cascading impacts, as in the case of COVID-19. Exposure to ecological stress and natural disasters are key determinants for the cultural “tightness” (strictness of rules, adherence to tradition, and severity of punishment) of societies (78). The literature on the median economic damages of climate change is profuse, but there is far less on financial tail risks, such as the possibility of global financial crises.

Past studies could be drawn upon to investigate societal risk. Relatively small, regional climate changes are linked to the transformation and even collapse of previous societies (79, 80). This could be due to declining resilience and the passing of tipping points in these societies. There is some evidence for critical slowing down in societies prior to their collapse (81, 82). However, care is needed in drawing lessons from premodern case studies. Prehistory and history should be studied to determine not just how past societies were affected by specific climate hazards but how those effects differ as societies change with respect to, for example, population density, wealth inequality, and governance regime. Such framing will allow past and current societies to be brought under a single system of analysis (37).

The characteristics and vulnerabilities of a modern globalized world where food and transport distribution systems can buffer against traumas will need to feature in work on societal sensitivity. Such large, interconnected systems bring their own sources of fragility, particularly if networks are relatively homogeneous, with a few dominant nodes highly connected to everyone else (83). Other important modern-day vulnerabilities include the rapid spread of misinformation and disinformation. These epistemic risks are serious concerns for public health crises (84) and have already hindered climate action. A highlevel and simplified depiction of how risk cascades could

unfold is provided in Fig. 3.

Integrated Catastrophic Assessments. Climate change will unfold in a world of changing ecosystems, geopolitics, and technology. Could we even see “warm wars”—technologically enhanced **great power conflicts** over **dwindling carbon budgets, climate impacts**, or SRM **experiments**? Such developments and scenarios need to be considered to build a full picture of climate dangers. Climate change could reinforce other interacting threats, including rising **inequality**, **demographic stresses, misinformation**, **new destructive weapons**, and the **overshoot** of other planetary boundaries (85). There are also natural shocks, such as solar flares and high-impact volcanic eruptions, that present possible deadly synchronicities (86). Exploring these is vital, and a range of “standardized catastrophic scenarios” would facilitate assessment.

### 1NC --- Accidents

**Trump is decking NRC independence which hurts safety.**

**Macfarlane 25** [Allison Macfarlane, Professor and director of the School of Public Policy and Global Affairs at the University of British Columbia, 2-21-2025, Trump just assaulted the independence of the nuclear regulator. What could go wrong?, Bulletin of the Atomic Scientists, https://thebulletin.org/2025/02/trump-just-assaulted-the-independence-of-the-nuclear-regulator-what-could-go-wrong/, GZR]

**President Trump, through** his recent Executive Order, has **attacked independent regulatory agencies in the US government**. This order gives the Office of Management and Budget power over the regulatory process of until-now independent agencies. **These regulatory agencies include the Federal Elections Commission, the Federal Trade Commission, the Securities and Exchange Commission, the Federal Energy Regulatory Commission**—and my former agency, the Nuclear Regulatory Commission, which I chaired between July 2012 and December 2014.

**An independent regulator is free from industry and political influence**. **Trump’s executive order flies in the face of this basic principle by requiring the Office of Management and Budget to** “**review**” **these independent regulatory agencies’ obligations** “for consistency with the President’s policies and priorities.” **This essentially means subordinating regulators to the president**.

In the past, the president and Congress, which has oversight capacity on the regulators, stayed at arm’s length from the regulators’ decisions. This was meant to keep them isolated, ensuring their necessary independence from any outside interference. Trump’s executive order implies there are no longer independent regulators in the United States.

Independent regulators should not only be free from government and industry meddling; they also need to be adequately staffed with competent experts and have the budget to operate efficiently. They also need to be able to shut down facilities such as nuclear power plants that are not operating safely, according to regulations. To do this, they need government to support their independent decisions and rulemaking.

**Independence matters**. When I was chairman, I traveled the world talking about the importance of an independent regulator to countries where nuclear regulators exhibited a lack of independence and were subject to excessive industry and political influence. It is ironic that the US Nuclear Regulatory Commission—often called the “Gold Standard” in nuclear regulation—has now been captured by the Trump administration and lost its independence. So much for the Gold Standard; the Canadian, the French, or the Finnish nuclear regulator will have to take on that mantle now.

**To understand what is at stake, one needs to look no further than the Fukushima accident** in March 2011, **which showed the world how a country’s economic security is vulnerable to a captured regulator**. After a magnitude 9.0 earthquake followed by a massive tsunami, the Fukushima Daiichi nuclear power plant, with its six reactors on Japan’s east coast, lost offsite power. The tsunami flooded their backup diesel generators, and the plant fell into the station blackout, leading to the complete loss of all power on site.

With no power to operate pumps to get cooling water into the reactors’ cores or into spent fuel storage pools, three reactor cores melted down—the first within hours of loss of power—with a concomitant release of large amounts of radionuclides due to containment breaches from hydrogen explosions.

Firefighters desperately tried to get water into the spent fuel pool of Unit 4 to ensure that pool water did not boil off since the pumps were no longer working. Should the spent fuel rods have become uncovered and no longer cooled, the fuel’s temperature would rapidly increase, and the fuel rods would melt, causing the release of even larger amounts of radiation material into the atmosphere threatening the Tokyo metropolitan area. Fortunately, the emergency workers got water to the pool within a few days of the fuel being uncovered.

Nonetheless, 160,000 people evacuated from the area near the reactors and along the corridor of radiation contamination to the northwest of the Fukushima Daiichi plant. Overnight, the agricultural and fishing industries near Fukushima were devastated. **Within a year after the accident, all 54 reactors in Japan were shut down**—**a loss of about a third of the country’s electricity supply**. More expensive diesel plants had to be set up to compensate for some of the missing power. The direct economic costs of the accident were estimated to be on the order of $200 billion—and even that number excluded the costs of replacing the lost power and multiple reactor shutdowns due to the reassessment of seismic hazards. **Nearly 14 years later, only 13 nuclear reactors have been turned back on, and 21 have been permanently shut down**. (The other 20 reactors are waiting for regulatory and prefecture approval.)

An independent investigation by the Diet (Japan’s house of parliament) into the cause of the Fukushima accident concluded unequivocally that: “**The TEPCO Fukushima Nuclear Power Plant accident was the result of collusion between the government, the regulators and TEPCO, and the lack of governance by said parties**. They effectively betrayed the nation’s right to be safe from nuclear accidents.” Japan’s government and nuclear industry continue to struggle with the clean-up of the Fukushima site, and it purposely began in 2023 to release still-contaminated water into the Pacific Ocean. Nearby countries responded by banning fishing products from the region.

As the industry often says, **a nuclear accident anywhere is a nuclear accident everywhere**. After the Fukushima accident, the US nuclear industry spent over $47 billion in safety upgrades to respond to lessons learned from the Fukushima accident. **These included the realization that not only more than one reactor could fail at a single power plant**, but also that backup generators needed to be in safe locations, not subject to flooding and other forms of failure; that generic fittings for pumps and equipment were needed so that any nearby equipment could be connected during an accident; that containments should be able to be vented remotely; that natural events such as earthquakes and flooding could be underestimated in the original reactor designs; and that spent fuel pools needed to provide real-time data in accident conditions. The upgrades that resulted from these lessons have greatly increased the safety of reactors in the United States and elsewhere. They were required because each of these upgrades was deemed necessary to address the lessons learned by the independent regulator. On its own, the industry might not have undertaken any of these measures.

What could go wrong? **Several possible outcomes could occur because of Trump’s new executive order assaulting the independence of the Nuclear Regulatory Commission** (NRC).

**Proponents of small modular reactors**, for instance, **have pressured Congress and the executive branch to reduce regulation** and hurry the NRC’s approval of their novel—and unproven—reactor designs. **They wish their reactors could be exempted from the requirements that all other designs before them have had to meet**: **detailed evidence that the reactors will operate safely** under accident conditions. Instead, **these proponents**—some **with no experience in operating reactors**—**want the NRC to trust their simplistic computer models** of reactor performance **and essentially give them a free pass to deploy their untested technology** across the country.

An accident with a new small modular reactor (SMR) would perhaps not make such a big mess: After all, the source term of radiation would be smaller than with large reactors, like those currently operating in the United States. But the accident in Japan demonstrated that countries should expect that more than one reactor at a given site can fail at the same time, and these multiple failures can create even more dire circumstances, impeding the authorities’ ability to respond to such a complex radiological emergency. At Fukushima, the first explosion at Unit 1 generated radioactive debris that prevented emergency responders from getting close to other damaged reactors nearby. Since designers plan to deploy multiple SMR units to individual sites, such an accidental scenario appears feasible with SMRs.

Since its creation in 1975, the Nuclear Regulatory Commission has had an excellent and essential mission: to ensure the safety and security of nuclear facilities and nuclear materials so that humans and the environment are not harmed. **Trump’s incursion means the agency will no longer be able to fully follow through with this mission independently**—and Americans will be more at risk as a result. **If any US reactor suffers a major accident, the entire industry will be impacted**—and perhaps **its 94 reactors in operation will even be temporarily shut down**. Can the industry and the American people afford the cost of losing the independence of the nuclear regulator?

**AND Energy Secretary Chris Wright has a history of neglecting safety.**

**Accountable 25** [Accountable US (Accountable.US (A.US) is a nonpartisan, 501(c)3 organization that shines a light on special interests that too often wield unchecked power and influence in Washington and beyond.)  February 4, 2025, Watchdog: Senate Confirms Oil Man & Serial Workplace Safety Violator Chris Wright as Trump’s Energy Secretary", https://accountable.us/watchdog-senate-confirms-oil-man-serial-workplace-safety-violator-chris-wright-as-trumps-energy-secretary/, GZR]

WASHINGTON, D.C. – Following the Republican-led Senate’s vote to confirm Chris Wright as **U.S. Energy Secretary**, Accountable.US Executive Director Tony Carrk released the following statement: “The choice of Chris Wright to run the powerful Energy Department was based on what’s best for the bottom line of Donald Trump’s big oil megadonors, not everyday consumers and workers. With his Project 2025 ties and financial stakes in the big oil and nuclear industry, Wright is just the wealthy insider Trump needs to carry out his plans for padding profits of energy special interests – even if it means higher prices at the pump. And with Wright’s company’s history of violating workplace safety standards and anti-discrimination laws, he’s now in the driver’s seat to sweep such problems under the rug for his industry friends.” BACKGROUND: Conflicts Of Interest With Energy Companies **Chris Wright is a member of the board of Oklo nuclear company and has business before the Department of Energy. Oklo’s application before the Nuclear Regulatory Commission was previously denied due to a lack of information about accidents and safety. Chris Wright claims he will step down from the board, but questions remain about whether he will fairly regulate and ensure accountability from energy industries** when he has spent so much of his career working for and serving on the boards of oil and gas and nuclear energy companies. Project 2025 Wright has been on the board of the Western Energy Alliance, an oil industry trade group that authored many of Project 2025’s oil and gas provisions. Chris Wright has been a member of the board of Western Energy Alliance (WEA) WEA is an oil industry trade group. WEA’s president authored the oil and gas provisions of Project 2025. Project 2025 would eliminate “key offices at the DOE, including the Office of Energy Efficiency and Renewable Energy, the Office of Clean Energy Demonstrations, the Office of State and Community Energy Programs, the Office of Grid Deployment, and the Loan Programs Office.” Workplace Safety and Racial Harassment **Questions remain whether Wright will look the other way when energy companies violate safety standards** and anti-discrimination laws, considering his company, Liberty Energy, was frequently fined over workplace safety standards and paid $265,000 to settle lawsuits from black and Hispanic employees who faced hostile work environment and were called slurs. **Under Chris Wright’s leadership, Liberty Energy has faced at least three separate penalties for workplace and safety violations** since 2023. Liberty Energy, in 2024, paid $265,000 to settle an EEOC discrimination lawsuit after black and Hispanic field mechanics faced racial harassment.

**Affirming gives Wright the keys.**

**Lynch 25** [James Lynch, news writer for National Review & B.A. in Political Science from Notre Dame, 2-7-2025, Chris Wright Makes Unleashing Nuclear Power Priority for American Energy Abundance, National Review, https://www.nationalreview.com/news/chris-wright-makes-unleashing-nuclear-power-priority-for-american-energy-abundance/, Willie T.]

In a letter to sent Thursday, American Nuclear Society CEO Craig Piercy suggested that Wright focus securing congressional appropriations to fulfill his promises about advancing the nuclear power industry and supporting innovative reactors.

“Many in the industry think additional government support will be needed to reach nth-of-a-kind nuclear plant construction **costs**, while others believe rising electricity demand alone will take care of that in time,” the letter reads.

“Either way, as secretary of energy, you will **need appropriations** to engineer any kind of nuclear ‘win.’ You will spend more time than you think **preparing budgets**, arguing with the Office of Management and Budget over what’s included, and then defending said budgets on Capitol Hill. Don’t let the bean counters steal from you!”

**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).

**Extinction!**

**Torres 16** [Phil Torres, 2-10-2016, "Biodiversity Loss and the Doomsday Clock: An Invisible Disaster Almost No One is Talking About," Common Dreams, https://www.commondreams.org/views/2016/02/10/biodiversity-loss-and-doomsday-clock-invisible-disaster-almost-no-one-talking-about, DOA: 3/30/2025] JZ

But there's another global catastrophe that the Bulletin neglected to consider -- **a catastrophe that will almost certainly have conflict multiplying effects no less than climate change. I'm referring here to biodiversity loss** -- i.e., the reduction in the total number of species, or in their population sizes, over time. The fact is that in the past few centuries, the loss of biological diversity around the world has accelerated at an incredible pace. Consider the findings of a 2015 paper published in Science Advances. According to this study, we've only recently entered the **early stages of the sixth mass extinction event in life's entire 3.5 billion year history.** The previous mass extinctions are known as the "Big Five," and the last one wiped out the dinosaurs some 65 million years ago. Unlike these past tragedies, though, the current mass extinction -- called the "Holocene extinction event" -- is almost entirely the result of a one species in particular, namely Homo sapiens (which ironically means the "wise man").

"If the environment implodes under the weight of civilization, then civilization itself is doomed."

But **biodiversity loss isn't limited to species extinctions.** As the founder of the Long Now Institute, Stewart Brand, suggests in an article for Aeon, one could argue that a more pressing issue is the reduction in population sizes around the globe. For example, the 3rd Global Biodiversity Report (GBO-3), published in 2010, found that the total abundance of vertebrates -- a category that includes mammals, birds, reptiles, sharks, rays, and amphibians -- living in the tropics declined by a whopping 59% between 1970 and 2006. In other words, the population size of creatures with a spine more than halved in only 36 years. The study also found that farmland birds in Europe have declined by 50% since 1980, birds in North America have declined by 40% between 1968 and 2003, and nearly 25% of all plant species are currently "threatened with extinction." The latter statistic is especially worth noting because many people suffer from what's called "plant blindness," according to which we fail "to recognize the importance of plants in the biosphere and in human affairs." Indeed, plants form the very bottom of the food chains upon which human life ultimately depends.

Even more disturbing is the claim that amphibians "face the greatest risk" of extinction, with "42% of all amphibian species ... declining in population," as the GBO-3 reports. Consistent with this, a more recent study from 2013 that focused on North America found that "frogs, toads and salamanders in the United States are disappearing from their habitats ... at an alarming and rapid rate," and are projected to "disappear from half of the habitats they currently occupy in about 20 years." The decline of amphibian populations is ominous because amphibians are "ecological indicators" that are more sensitive to environmental changes than other organisms. As such they are the "canaries in the coal mine" that reflect the overall health of the ecosystems in which they reside. **When they start to disappear, bigger problems are sure to follow.**

Yet another comprehensive survey of the biosphere comes from the Living Planet Report -- and its results are no less dismal than those of the GBO-3. For example, it finds that the global population of vertebrates between 1970 and 2010 dropped by an unbelievable 52%. Although the authors refrain from making any predictions based on their data, the reader is welcome to extrapolate this trend into the near future, noting that **as ecosystems weaken, the likelihood of further population losses increases.** This study thus concludes that humanity would "need 1.5 Earths to meet the demands we currently make on nature," meaning that we either need to reduce our collective consumption and adopt less myopic economic policies or hurry up and start colonizing the solar system.

Other studies have found that 20% of all reptile species, 48% of all the world's primates, 50% of all freshwater turtles, and68% of plant species are currently threatened with extinction. There's also talk about the Cavendish banana going extinct as a result of a fungus, and research has confirmed that honey bees, which remain "the most important insect that transfers pollen between flowers and between plants," are dying out around the world at an alarming rate due to what's called "colony collapse disorder" -- perhaps a good metaphor for our technologically advanced civilization and its self-destructive tendencies.

Turning to the world's oceans, one finds few reasons for optimism here as well. Consider the fact that atmospheric carbon dioxide -- the byproduct of burning fossil fuels -- is not only warming up the oceans, but it's making them far more acidic. The resulting changes in ocean chemistry are inducing a process known as "coral bleaching," whereby coral loses the algae (called "zooxanthellae") that it needs to survive. Today, roughly 60% of coral reefs are in danger of becoming underwater ghost towns, and some 10% are already dead. This has **direct consequences for humanity because coral reefs "provide us with food, construction materials (limestone) and new medicines,"** and in fact "more than half of new cancer drug research is focused on marine organisms." Similarly, yet another study found that ocean acidification is becoming so pronounced that the shells of "tiny marine snails that live along North America's western coast" are literally dissolving in the water, resulting in "pitted textures" that give the shells a "cauliflower" or "sandpaper" appearance.

Furthermore, human-created pollution that makes its way into the oceans is carving out vast regions in which the amount of dissolved oxygen is too low for marine life to survive. These regions are called "dead zones," and the most recent count by Robert Diaz and his colleagues found more than 500 around the world. The biggest dead zone discovered so far is located in the Baltic Sea, and it's been estimated to be about 27,000 square miles, or a little less than the size of New Hampshire, Vermont, and Maryland combined. Scientists have even discovered an "island" of trash in the middle of the Pacific called the "Great Pacific Garbage Patch" that could be up to "twice the size of the continental United States." Similar "patches" of floating plastic debris can be found in the Atlantic and Indian oceans as well, although these are not quite as impressive. The point is that "Earth's final frontier" -- the oceans -- are becoming vast watery graveyards for a huge diversity of marine lifeforms, and in fact a 2006 paper in Science predicts that there could be virtually no more wild-caught seafood by 2048.

Everywhere one looks, the biosphere is wilting -- and a single bipedal species with large brains and opposable thumbs is almost entirely responsible for this worsening plight. If humanity continues to prune back the Tree of Life with reckless abandon, we could be forced to confront a global disaster of truly unprecedented proportions. Along these lines, a 2012 article published in Nature and authored by over twenty scientists claims that humanity could be **teetering on the brink of a catastrophic, irreversible collapse of the global ecosystem**. According to the paper, there could be **"tipping points" -- also called "critical thresholds" -- lurking in the environment that, once crossed, could initiate radical and sudden changes in the biosphere**. Thus, an event of this sort could be preceded by little or no warning: everything might look more or less okay, until the ecosystem is suddenly in ruins.

We must, moving forward, never forget that just as we're minds embodied, so too are we bodies environed, meaning that **if the environment implodes under the weight of civilization, then civilization itself is doomed.** While the threat of nuclear weapons deserves serious attention from political leaders and academics, as the Bulletin correctly observes, it's even more imperative that we focus on the broader "contextual problems" that **could inflate the overall probability of wars and terrorism in the future.** Climate change and biodiversity loss are both conflict multipliers of precisely this sort, and each is a contributing factor that's exacerbating the other. If we fail to make these threats a top priority in 2016, the **likelihood of nuclear weapons -- or some other form of emerging technology, including biotechnology and artificial intelligence -- being used in the future will only increase.**

Perhaps there's still time to **avert the sixth mass extinction** or a sudden collapse of the global ecosystem. But time is running out -- the doomsday clock is ticking.

### 1NC --- Poland

**Poland wants nukes BUT lacks capacity.**

**Naughtie 25** [Andrew Naughtie, BSc in Sociology @ the University of Bristol & MA in Social Sciences from UChicago, 3-21-2025, Could another European country develop its own nuclear weapons?, EuroNews, https://www.euronews.com/2025/03/21/could-another-european-country-develop-its-own-nuclear-weapons, Willie T.]

Building up a nuclear deterrent from scratch is **no easy feat**, but with the US distancing itself from Europe, the idea has **started to resurface.**

“Poland **must pursue** the most advanced capabilities, including **nuclear** and modern unconventional weapons,” Polish Prime Minister Donald Tusk told his country’s parliament earlier this month. “This is a serious race — a race for security, not for war.”

Coming as the Trump administration signalled it is **essentially pulling back** from protecting Europe, Tusk's statement seemed to suggest a potential **lurch toward nuclear weapons** proliferation in Europe — something at odds with decades of European policy.

While questions remain over the US' ongoing commitment to its role as Europe’s nuclear security guarantor, **China is expanding** its nuclear arsenal. And **Russia**, which maintains the world’s largest stockpile of warheads, **repeatedly invokes the threat of using them** to warn NATO and the EU against getting directly militarily involved in Ukraine.

The overall picture raises two difficult questions. How can Europe maintain a continent-wide nuclear deterrent? And is there a possibility that other countries will join the nuclear club?

Although some European states have some of the elements required to develop independent nuclear weapons capability, experts say the chances of another European state going nuclear are **slim.**

Starting from scratch

According to Fabian Rene Hoffmann, a research fellow at the Oslo Nuclear Project, even if one of Europe’s NATO powers were keen to develop its own nuclear weapons rather than simply hosting them, it would find itself at a standing start.

“The major issue European countries are facing is that they either **don’t deploy the civilian nuclear infrastructure** to launch a nuclear weapons programme, or, if they have civilian nuclear infrastructure, that it is highly ‘proliferation-resistant’,” he told Euronews.

“For example, Finland and Sweden only have light-water reactors, which are not suitable for the production of weapons-grade plutonium. In addition, neither of those countries have chemical reprocessing plants that are needed for separating wanted from unwanted isotopes in fissile material production."

**They’ve turned to American company Westinghouse.**

**Hayden 22** [Jones Hayden, Energy & Climate Correspondent @ Politico, 10-29-2022, Poland picks Westinghouse to build its first nuclear plant, POLITICO, https://www.politico.eu/article/poland-picks-westinghouse-to-build-its-first-nuclear-power-plant/, Willie T.]

Poland awarded a contract to build its first nuclear power plant to a **U.S. bid** as the country seeks to burn less coal and increase its energy independence.

The government in Warsaw chose **Westinghouse** for the nuclear project, Prime Minister Mateusz Morawiecki said late Friday in a tweet praising the U.S. company’s “reliable, safe technology.”

“A strong Poland-U.S. alliance guarantees the success of our joint initiatives,” Morawiecki said.

**America’s provided funding BUT only more allows completion.**

**Brodacki 25** [Dominik Brodacki, analyses the energy and fuels sector + co-author of the PI Energy briefing + expert at the Ignacy Lukasiewicz Institute for Energy Policy since 2016 + lawyer for Polish and foreign companies + Author of scientific publications, reports and market analyses, including on energy policy, energy law, nuclear power, offshore wind energy and district heating sector + Graduated in Law and European Studies from the University of Warsaw, 2025, Nuclear Energy in Poland: Assessment of Readiness for the Construction of the First Nuclear Power Plant, Baker McKenzie, https://www.bakermckenzie.com/-/media/files/locations/poland/nuclear-energy-in-poland/baker-mckenzie-polityka-insight-report-nuclear-energy-in-poland-2025\_eng.pdf, Willie T.]

The above also makes it difficult to precisely determine the final cost of building NPP1 (despite the indicative amount of PLN 192 billion given by the Council of Ministers in its notification to the EC). This is because it depends, among other things, on the outcome of the power plant design process (which will determine the specific solutions to be applied), discussions with the EC and the detailed provisions of the EPC contract. As a result, it is not possible at this stage to make a final decision on the detailed method of financing the investment.

**None of the nuclear projects** under construction in Poland has fully secured financing.

The investment in NPP1 is the most advanced in this respect – as mentioned above, its implementation is to be supported by public funds, including in the form of a direct capital injection into the NPP of around PLN 60.2 billion.

In February 2025, the Parliament adopted an amendment to the Special Nuclear Act, according to which state aid will be transferred to PEJ in the form of a capital increase by the State Treasury in exchange for shares in the company. Of this amount, PEJ is to receive for the preparation and implementation of the construction of NPP1 and accompanying investments, as well as its current operations: PLN 4.6 billion in 2025, PLN 11 billion in 2026, PLN 14 billion in 2027, PLN 13 billion in 2028, PLN 11 billion in 2029 and PLN 6.6 billion in 2030.

It is known that their disbursement will be possible only after the EC approval following the notification of the support programme for the construction and operation of NPP1.

Approximately 70% of the construction costs of NPP1 will be covered by **external financing**, of which two-thirds will be provided by export credit agencies and the rest by commercial financial institutions. PEJ has secured declarations (in the form of letters of intent) of financial commitment for approximately PLN 95 billion from, among others: the **Export-Import Bank of the United States** (EXIM), **U.S. International Development Finance Corporation**, Bpifrance Assurance Export, Sfil and Export Development Canada. Taking into account the aforementioned capital injection of around PLN 60.2 billion, there are still **tens of billions missing** to cover the estimated project budget (around PLN 192 billion).

**Empirically, US investment in Westinghouse got the project started.**

**Kraev 21** [Kamen Kraev, senior editor and secretary-general at NucNet, 9-24-2021, Poland/US Wants To Speed Up Westinghouse AP1000 Study, Says Energy Secretary Granholm, NucNet, https://www.nucnet.org/news/us-wants-to-speed-up-westinghouse-ap1000-study-says-energy-secretary-granholm-9-5-2021, Willie T.]

The US government wants to accelerate its support for a front-end engineering and design study for the deployment of **US-made** AP1000 reactor technology in Poland, US energy secretary Jennifer Granholm said.  
  
In July, **US-based Westinghouse** Electric Company and Bechtel Corporation announced the start of the study, which will provide Poland’s Polskie Elektrownie Jądrowe (PEJ) – the company responsible for managing the country’s **first nuclear power project** – with layout plans for the **location** of a first nuclear power station, together with a **licensing** plan, project **schedule** and **cost** estimate.  
  
The **US Trade and Development Agency** has released a grant to fund the study.

“US industry and government have come together at a **critical juncture** in the development of Poland’s nuclear energy programme,” Ms Granholm said during a press conference in Warsaw.

**Competition decks prolif safeguards.**

**Gilinsky 20** [Victor Gilinsky, former Commissioner of the Nuclear Regulatory Commission, and Henry Sokolski, Executive Director of NPEC, 5-15-2020, "“Bad Business: Pushing US Nuclear Exports,” The American Interest – NPEC", Nonproliferation Policy Education Center, https://npolicy.org/bad-business-pushing-us-nuclear-exports-the-american-interest/] //dg

The nuclear industry and the Department of Energy (DOE) want to raid our wallets…again. This time, it’s not to save the planet, but supposedly to give industry a fighting chance against rising Russian and Chinese civilian nuclear export competition.

As Victor Gilinsky and I warn in “The Nuclear Industry at the Feeding Trough,” posted by The American Interest, the American taxpayer shouldn’t buy this.

First, the Russian and Chinese nuclear industry is not as healthy or as influential as claimed. Second, the nuclear industry’s pleas (most recently trumpeted in DOE’s nuclear strategy report, “Restoring America’s Competitive Nuclear Energy Advantage”) presume an American commercial nuclear industry that no longer exists. Westinghouse, General Electric, and Combustion Engineering have sold themselves out to foreign partners and holding companies. US nuclear exports are no longer significant. Also, US nuclear electricity is now more expensive than gas-fired electricity, hydroelectric, and renewables.

Finally, **what the industry is demanding** in regulations to promote **exports** — a **relaxed** approach to nuclear **nonproliferation controls** — **will** actually **undermine** America’s **national security.**

May 15, 2020

AUTHOR: Henry Sokolski and Victor Gilinsky

Bad Business: Pushing US Nuclear Exports

By Henry Sokolski and Victor Gilinsky

The nuclear lobby is playing the national security card in trying to justify federal handouts. It’s a con.

We are getting used to brazen coronavirus claims for federal largess, but it’s hard to beat the claims coming from the nuclear industry. Even before the pandemic hit, it had for the most part given up competing for new power plant sales in the domestic and international energy marketplace and instead was wrapping itself in the flag and declaring itself essential to U.S. national security, and therefore deserving of generous federal support.

This approach has the full backing of the Trump Energy Department, and has been dutifully rolled out as part of the broader scramble for federal relief funds unleashed by the coronavirus crisis. As Energy Secretary Danny Ray Brouillette made clear to radio talk show host Hugh Hewitt in an April 28 interview:

We’ve lost our leadership both on the technology side and on the market side… to the Russians and the Chinese. And why does that matter? Well, obviously it matters, because we are, we were the world leader not only in the development of nuclear technology, but in the export of this technology around the world. And we lost that, and it leads to a national defense issue.

**And, indeed, DOE’s web site announces: “Nuclear power is intrinsically tied to National Security.”** Among the ways DOE plans to restore American nuclear energy leadership are “minimizing commercial fleet fiscal vulnerabilities [DOE-speak for subsidizing],” and “leveling the playing field against state-owned enterprises.”

**The implication is that other countries are not competing fairly, as if they snuck around us to jump the line. Now, to cope with this, we have to sweeten the deals we offer to get the sales.** And as a thriving nuclear sector is **supposedly** a necessary condition for gaining foreign sales, **we have to prop up domestic nuclear plants, too.**

If nothing else, **there is a stunning lack of self-awareness in this view.** Yes, the United States pioneered the light water reactor technology used around the world. But, as a result of U.S. business decisions, in part reflecting the unfavorable economics of nuclear power in the United States but also poor management, we effectively no longer have any reactor manufacturers.

Combustion Engineering, a company with 28,000 employees, a pressurized water reactor manufacturer, sold itself in 1989 to the European firm ABB Asea Brown Boveri Ltd. The great Westinghouse firm, once the world leader on pressurized water reactors, blundered financially into becoming a subsidiary of the CBS Corporation. In 1995, CBS sold it to British Nuclear Fuels Limited. BNFL in turn sold Westinghouse nuclear activities to Toshiba in 2006.

Westinghouse, by then a shell of its former self, performed so miserably in constructing the last large reactors to be built in the United States in South Carolina and Georgia that it went bankrupt and almost took Toshiba down, too. The South Carolina owners canceled their two plants, and the remaining two in Georgia will cost nearly $30 billion, double the original contract price. After this experience, it is hard to see any future sales of large reactors in the United States.

General Electric used to build boiling water reactors, but it only offers sales abroad as a junior partner to Japan’s Hitachi Corporation. Its reputation is anyway tarnished because it designed the plants that failed during the 2011 Fukushima accident. In short, U.S. nuclear plant manufacturing capabilities are much diminished, and the domestic market just isn’t there. And it isn’t there because nuclear economics are extremely unfavorable.

Currently, the US still has 95 power reactors online, supplying a bit less than 20 percent of America’s electrical demand. They are on average 39 years old. Only two plants, the ones in Georgia, are now under construction and they are expected to be the last large ones to be built for some time.

That hasn’t fazed the nuclear faithful both in and out of government. **They still think,** as their predecessors thought sixty years ago, that **nuclear power is the technology of the future. They paint a picture of our putative arch-enemies, Russia and China, selling nuclear power plants and locking up nuclear relationships with numerous states, including important friendly states such as Saudi Arabia and Turkey,** relationships that will last for the rest of the century. We will be frozen out and will thereby lose influence throughout the world. **But it’s still not too late if we follow the advice of the Energy Department, the nuclear industry, and a gaggle of consultants looking to cash in.**

**What is it we have to do? The battles in Washington turn on so-called agreements for cooperation with potential customers that are prerequisites for sales of major reactors and components. The main issue concerns whether we will accept customers that also want to acquire acquires auxiliary facilities that can be used to produce plutonium and highly enriched uranium, the fuels that are also the explosives used in nuclear weapons. The only position consistent with non-proliferation, halting the spread of nuclear weapons, is “no.”**

But the **nuclear enthusiasts** say that’s too strict, that others have more accommodating terms, and that if we sell with **looser terms**, we’ll have more influence. They have their eye especially on Saudi Arabia, a country that at one point said, implausibly, it was going to build 16 nuclear power plants. They don’t seem to pay attention to the other thing the Saudis said—**the crown prince’s statement that if Iran was going to get a bomb, he was going to get one, too, and fast.**

I**t’s not just the Trump** crowd that opposes tightening security rules over nuclear exports (in the name, they say, of security). President **Obama’s** Energy Secretary, Ernest Moniz, has been arguing that subsidizing domestic nuclear power and encouraging nuclear sales without especially tight security restrictions—restrictions that go by the rubric of “gold standard”—are in the interests of U.S. nuclear security, and even support the deterrence value of our nuclear weapons.

All this is a bit much. **Do we really think that Russia, with a GNP below that of Italy, is capable of freezing us out of the world? Does it have the financial capacity to offer generous terms on many projects? Will they ever be completed?**

**Nuclear power is just one U.S. export technology**, and not exactly the most promising. For example, the U.S. exported $136 billion in aircraft last year; U.S. nuclear exports for the same period could only be measured in millions of dollars. **China is building a comparatively large number of nuclear plants but nuclear power supplies less than five percent of its electrical demand** and is only projected to account for seven percent by 2040. **Any large accident will turn this program off**.

**It’s used for hegemonic expansion --- incites Russian fears and conflict.**

**Ramana 24** [M.V. Ramana, Professor @ University of British Columbia’s School of Public Policy and Global Affairs, 8-2-2024, Eastern Europe’s purchase of US nuclear reactors is primarily about military ties, not climate change, Bulletin of the Atomic Scientists, https://thebulletin.org/2024/08/eastern-europes-purchase-of-us-nuclear-reactors-is-primarily-about-military-ties-not-climate-change/, Willie T.]

US officials see the purchase of military equipment as one of the many ways the United States can bring Poland closer in geopolitical terms. Another is to have them buy US nuclear reactors.

In its “**Integrated Country Strategy**” for Poland from June 2022, the US State Department’s top **two mission goals** were stated to involve **military** engagement and adoption of new **energy** technology, **including nuclear power**. The document praises the “potential partnership with the United States to develop large-scale nuclear power plants with US technology” because it “could result in over $18 billion dollars in US exports and strategically tie our two countries even more tightly together over the coming century.” It should be **clear who would profit** most at the expense of the Polish public.

The United States has **historically** tried to use nuclear development to **expand its empire and influence**. During the Cold War, US nuclear power companies “had a **specific agenda** to promote the advancement of nuclear technology in non-communist countries,” which was one reason they **exported nuclear reactors to South Korea.**

By all evidence, the focus on nuclear energy in Eastern Europe appears not to be driven mainly by climate change but by old-fashioned **geopolitics in significant proportion**. Were the urgency of climate change really driving investment in nuclear energy, Poland should have considered purchasing reactors also from Russia or China. In fact, over the past decade, Russia has **dominated the export market** for nuclear power plants and China has **built more nuclear plants** than any other country.

Why it matters. The **geopolitical framing** of imports of nuclear energy is a problem, especially in Eastern Europe where there is an active war in neighboring Ukraine. Building up military forces using US technology and expanding US military presence in the region, even possibly basing nuclear weapons in Poland, may increase the likelihood of a **catastrophic war** between **Russia and NATO**. Such a war would be compounded by the potential for radioactive contamination from deliberate or inadvertent attacks on nuclear reactors, as illustrated by the Zaporizhzhia nuclear plant in Ukraine, which Russia has occupied since March 2022 and used as a source of leverage.

Such **geopolitical games** also make dealing with climate change much more difficult. A geopolitical view, by its very nature, conceives of problems essentially as a **zero-sum competition:** Countries will avoid cooperating with each other. But as happened with the global response to the COVID-19 pandemic, the **lack of cooperation** will undermine the chances of quickly reducing global emissions.

The analyst and disarmament activist Andrew Lichterman recently explained that anyone interested in a more fair, peaceful, and ecologically sustainable global society should avoid using “the conceptual frame of geopolitics” which “is limited to the imperatives of holding and deploying power in what is portrayed as an endless, inevitable struggle for dominance among the world’s most powerful states.”

**Investments** in nuclear power in Eastern Europe hide **geopolitical and military motivations** behind a **smoke screen** of fighting climate change. When these motivations result in the massive acquisition of military equipment, manufacturing and operating them will increase carbon dioxide emissions. Worse, military buildups will also increase the risk of conflict, potentially leading to a **catastrophic war** that could **involve nuclear weapons.**

**Steps to prolif cause pre-emption.**

**Hoffmann 24** [Fabian Hoffmann, Doctoral Research Fellow @ the University of Oslo, 1-29-2024, The Future of the Zeitenwende: Scenario 5—Poland Becomes a Nuclear Power, International Politik Quarterly, https://ip-quarterly.com/en/future-zeitenwende-scenario-5-poland-becomes-nuclear-power, Willie T.]

Similarly, given that Polish nuclear proliferation might occur in the context of a crumbling nuclear order where non-proliferation norms have already been drastically undermined by several other instances of nuclear proliferation, any outcry based on the normative implications of Polish nuclear proliferation may be limited.

Finally, **active steps** by Poland toward a nuclear deterrent may temporarily destabilize the European security environment, due to heightened pressures on the Russian side for military operations aimed at **preempting** a Polish nuclear arsenal. Once Poland has acquired nuclear weapons, Poland’s nuclear deterrent may serve to reinforce European deterrence. This being said, the exact dynamics that a Polish nuclear acquisition might induce into Europe’s security architecture are impossible to predict from today’s point of view.

**NATO-Russia war goes nuclear.**

**Kulesa 18** [Lukasz Kulesa; Director of Proliferation and Nuclear Policy at the Royal United Services Institute; 02-01-2018; "Envisioning a Russia-NATO Conflict: Implications for Deterrence Stability"; JSTOR; https://www.jstor.org/stable/resrep17437; accessed 11-14-2024] leon

Escalation: Can a NATO - Russia conflict be managed?

Once a conflict was **under way**, the “**fog of war**” and **rising unpredictability** would **inevitably** set in, **complicating** the **implementation** of any predetermined theories of escalation, deescalation and inter-conflict management. The **actual** dynamics of a conflict and the perceptions of the stakes involved are **extremely difficult** to predict. **Simulations** and table-top exercises can give only limited insights into the actual decision-making processes and interactions.

Still, Russian **military theorists** and practitioners seem to **assume** that a **conflict** with **NATO** can be **managed** and **controlled** in a way that would bring it to a **swift end** consistent with **Russian aims**. The Russian **theory** of **victory** would seek to **exploit weak points** in an Alliance **war effort**. Based on the **conviction** that **democracies** are **weak** and their leaders and populations are risk-averse, Russia may **assume** that its threats of **horizontal** or **vertical escalation** could be particularly effective. It would also try to bring **home** the **notion** that it has much **higher stakes** in the **conflict** (regime survival) than a majority of the **NATO members** involved, and thus will be **ready** to **push** the **boundaries** of the conflict **further**. It would most likely try to **test** and **exploit** potential **divisions** within the Alliance, combining **selective diplomacy** and **activation** of its intelligence assets in some NATO states with a degree of selectivity in terms of targets of particular attacks.

**Any** NATO-Russia conflict would **inevitably** have a **nuclear dimension**. The role of **nuclear weapons** as a tool for **escalation control** for Russia has been thoroughly **debated** by **experts**, but when and how Russia **might use** (and not merely showcase or activate) **nuclear weapons** in a conflict remains an **open question**. Beyond catch phrases such as “**escalate** to **de-escalate**” or “escalate to win” there are a **wider range** of **options** for Russian **nuclear weapon** use. For example, a single **nuclear warning shot** could be **lethal** or **non-lethal**. It could be **directed** against a purely **military target** or a military-civilian one. **Detonation** could be **configured** for an **EMP effect**. A “**false flag**” attack is also **conceivable**. These **options** might be used to **signal escalation** and could **significantly complicate** NATO’s responses.

Neither NATO nor its member states have developed a similar theory of victory. Public NATO documents stipulate the general goals for the Alliance: defend against any armed attack and, as needed, restore the full sovereignty and territorial integrity of member states. It is **less clear** how far the **Alliance** would be **willing** to **escalate** the **conflict** to achieve these goals, and what **mechanisms** and means it would **use** while **trying** to **maintain** some degree of **control** over the conflict.

The **goals** and methods of **waging** a **conflict** with **Russia** would probably have to be **limited** in order to **avoid** a massive **nuclear exchange**. **Such limitations** would also involve restrictions on striking back against targets on Russian territory. But too narrow an approach could put **too much restraint** on **NATO’s operations**: the Russian **regime’s stability** may ultimately need to be **threatened** in order to **force the leadership** into **terminating** the **conflict**. NATO would thus need to establish what a proportional self-defence response to Russian actions would involve, and to what extent cyber operations or attacks against military targets in quite different parts of Russia would be useful as tools of escalation to signal NATO’s resolve. Moreover, individual NATO Allies, especially those directly affected by Russia’s actions, might pursue their individual strategies of escalation.

With regards to the nuclear dimension in NATO escalation plans, given the stakes involved, this element would most likely be handled by the three nuclear-weapon members of the Alliance, with the US taking the lead. The existence of three independent centres of nuclear decision-making could be exploited to complicate Russian planning and introduce uncertainty into the Russian strategic calculus, but some degree of “P3” dialogue and coordination would be beneficial. This coordination would not necessarily focus on nuclear targeting, but rather on designing coordinated operations to demonstrate resolve in order to keep the conflict below the nuclear threshold, or bring it back under the threshold after first use.

Relying on concepts of **escalation control** and on lessons from the **Cold War** confrontation might be **misleading**. The **circumstances** in which a **Russia-NATO** conflict would **play out** would be **radically different** from the **20th century** screenplay. Moreover, instead of **gradual** (linear) escalation or **salami tactics** escalation, it is **possible** to **imagine** surprizing “**leap frog**” escalation, possibly connected with actions in **different domains** (e.g. a cyberattack against critical infrastructure). Flexibility, good intelligence and inventiveness in responding to such developments would be crucial.

Conflict termination

Russian and NATO assumptions regarding conflict termination would most likely **not survive** the **first hours** of an actual conflict. Both sides are capable of **underestimating** the **resolve** of the **other side** to **prevail** in a conflict and the other side’s **willingness** to commit the necessary resources and **endure** the **costs**, **especially** once **both** sides **start committing** their **political capital** and resources and the casualties accumulate.

### 1NC --- Russia

**Russia’s economy is at the brink --- oil is Putin’s lifeline.**

**Matthews 25** [Owen Matthews, Degree in Modern History at Oxford University, 3-13-2025, The Russian economy is on the **brink of collapse** and Putin knows it, The Independent, https://www.the-independent.com/news/world/europe/russia-economy-putin-ukraine-war-deal-talks-trump-b2714371.html, Willie T.] \*\*edited for objectionable language\*\*

How close is Russia’s economy to collapse? As Donald Trump’s negotiators open direct talks with the Kremlin, Kyiv’s European allies hope that a final push on sanctions against Russia could be Ukraine’s last – and best – hope of victory. Mr Trump has warned that the US could impose a “devastating” financial blow on Russia if Putin refuses to accept the ceasefire agreement. “There are things you can do that wouldn’t be pleasant in a financial sense. I can do things financially,” he said in the Oval Office.

Putin intended his full-scale invasion of Ukraine to be a three-day operation that would force regime change in Kyiv. Neither Putin nor his military or economic planners anticipated a grinding war that now soaks up over **40 per cent of Kremlin spending**.

Nor did they expect Europe to impose serious sanctions, and even less did they anticipate the destruction of three of the four Gazprom gas pipelines under the Baltic Sea that before the war supplied over 30 per cent of Europe’s gas.

The result in Russia has been **rampant inflation**, currently running at over 9 per cent, crippling **[staggering] interest rates** of 21 per cent and runaway price hikes on staple goods that far **outpace the headline inflation rate** and have hit ordinary Russians hard.

Last summer the price of **eggs jumped by 42 per cent**, **bananas by 48 per cent, tomatoes by 39.5 per cent and potatoes by 25 per cent**. The Russian ruble has lost over **half of its value** since Putin first invaded Crimea in 2014, and over $600bn of the Kremlin’s foreign currency reserves have been frozen in Western banks.

More than **1,000 Western businesses** – including Ikea and McDonald’s – pulled out, as did Western car manufacturers. Imports of Western goods – especially technology – are now **expensively routed through sanctions-busting neighbours** like Kazakhstan and Georgia. And last month Russian utility companies hiked prices for electricity by up to **250 per cent.**

“Everyone drives Chinese cars these days, but there are no spare parts,” says Alexandra, 39, a former journalist who lives in Moscow and whose ex-husband is fighting in Ukraine. “The only foreign cars you buy are right-hand-drive [from Japan]. Anyone with a mortgage is paying crazy interest. People complain how expensive everything has become.”

Russia spent more on its military in 2024 than the rest of Europe combined, according to the International Institute for Strategic Studies’ latest Military Balance report – a staggering $462bn, if adjusted for purchasing power. The Kremlin’s spending splurge on its war effort has produced some winners, notably the 1.5 million troops currently serving in Putin’s army who are paid up to $2,500 a month to fight – four times the average salary in Russia’s most impoverished provinces.

Massive losses on the battlefield have **worsened labour shortages**, with a record-low unemployment rate of 2.4 per cent. Factories are **running at capacity and beyond**. Russia’s economy has “reached the **limits of its productive capacity** while demand continues to be stimulated,” Central Bank chief Elvira Nabiullina warned the Russian parliament in November, predicting a fatal combination of economic stagnation and inflation known as “stagflation”.

For the first three years of the war, the Kremlin’s war spending fuelled GDP growth which peaked at a staggering 5.4 per cent in early 2024. But 2025 will be the year that growth flatlines, experts predict.

The Kremlin has been able to afford its spending spree thanks, mostly, to India and China, which have continued to import Russian oil in record quantities. The EU has in theory capped the price that customers can pay for Russian Urals crude at $60 a barrel – somewhat below the current market price of $67. But so-called “attestation fraud” – such as making up the difference in fake transportation and other costs – makes the rules easy to bend.

Natural gas has **never been sanctioned** by the EU at all – and until 1 January of this year, 13 per cent of Europe’s piped gas was still being shipped from Russia through Ukrainian pipelines to Slovakia and Hungary.

Ukrainian fire and fury are currently doing damage to Russia’s war economy that near-**nonexistent European sanctions have failed to achieve**

Southern Europe **continues to import** millions of cubic meters of Russian gas via Turkey. And despite its posturing, Europe still sources more than 15 per cent of its liquefied natural gas or LNG from Russia – with some 17.8m tonnes of LNG docking in European ports in 2024, **up by more than 2 million tonnes from the year before**, according to analysts Rystad Energy.

In fact the only really effective “sanctions” on the Russian energy sector – which accounts for over **two-thirds of government revenues** – have been in the form of Ukrainian drone attacks on Russian oil refineries, pumping stations and storage facilities. Ukrainian fire and fury are currently doing damage to Russia’s war economy that European “sanctions” have failed to achieve.

International pressure has made it harder, but not impossible, for the Russian war machine to obtain important components such as semiconductors. And sanctions have certainly “achieved the crucial goal of leaving Russia’s economy highly unstable in the medium to long term”, according to Oliver Ruth of London’s Royal United Services Institute.

The current crazy levels of expenditure are unsustainable, so Putin has a strong economic incentive to bring his war to an end. Ukraine’s economy is also under attack.

But on the flip side, even as Russia’s economy slips into stagflation Ukraine’s economy is doing far worse. Concerted Russian assaults, damage to vital energy infrastructure and mass emigration have inflicted catastrophic damage of up to 40 per cent of the country’s pre-war GDP. Kyiv’s budget payments to millions of soldiers and state employees are currently being paid by the EU. Without those subsidies – the lion’s share of the €60bn in direct financial support so far sent by Brussels – Ukraine’s government finances would instantly collapse.

Ukraine’s European allies hoped that sanctions would force Putin into taking an early off ramp and bring his **economy crashing down**. That hasn’t yet happened yet – largely because Europe has been unable to kick its addiction to Russian gas, and the US did not want to risk a global **oil price spike by cutting off Russian exports.**

But while they have **not brought Putin to his knees**, they have made the war disastrous for Russia. As Moscow and Washington begin talks in Riyadh, and European leaders hold their own emergency meeting, keeping up economic pressure on Putin is the real weapon that they still have left in their arsenal.

**Affirming collapses state stability.**

**Proedrou 23** [Filippos; Senior Lecturer in Global Political Economy @ the University of South Wales, PhD in IR from the University of Thrace; November 10; Elgar; “Chapter 27: The global energy transition and Russian structural power: scenarios and strategic options,” https://www.elgaronline.com/edcollchap/book/9781800370432/book-part-9781800370432-35.xml; DOA: 3-21-2025] tristan

Lower fossil-induced profits will test the current rent-based social contract (Scholten et al., 2019, p. 190). **Shrinking** budget **revenues** will **decelerate** the country’s **fiscal** **capacity** to **maintain** the **wealth** and the **welfare** level of the Russian population (Henderson & Mitrova, 2020, p. 110). The ensuing likely **removal** of gas **subsidies** and **cuts** to **healthcare**, **education** and **social** **services** have the potential to **destabilize** the **regime**. This will be so especially in the resource-producing regions, which are going to be hit the hardest by the progressive divestment from the fossil industry. One could counterargue that Russia retains strong fiscal capacity and has managed to successfully support its budget in cases of low oil prices. Hence, one should not anticipate such drastic deterioration of the social contract in Russia. Nevertheless, and while Russia will manage to offset some of these repercussions at least for some time, the pace and **scale** of the **revenue** **decrease** caused by the global energy transition is **expected** to be very **severe**. More importantly, **unlike** the **case** of **low** oil **prices** that at some point **rebound** in **normal** boom-and-bust **cycles**, the trend of the **global** **energy** **transition** will be exactly towards **lower** oil and gas quantities exported and lower prices (Coffin et al., 2021), thus bringing the **Russian** **economy** to its **knees**. Such **developments** are likely to **increase** the **infighting** between the **Russian** **elites** as the **consolidated** **power** of incumbents **weakens**, thus opening up a **window** of **opportunity** for **contenders** (Øverland, 2021). This, at the same time, can **intensify** (a sense of) non-governability and **instability**, and precipitate/invite **insurrections** and **separatist** **movements**, as separatist factions may **perceive** **Russian** **impoverishment** and **economic** **hardship** as the **opening** of a **grand** **opportunity** for achieving longstanding **political** **goals**. The precedent of Chechnya in an impoverished and largely unproductive Russia in the 1990s (Aliyev, 2013) may offer insight into the likely internal political problems Russia may face once the global energy transition dilutes a substantial chunk of Russia’s budget and spending capacity. **Regional** **nationalism** in, among others, Tatarstan, Bashkortostan, the Urals and the Far East (exposing the populations to Chinese influence and encroachment) renders **secessionist** **tendencies** a **real** **danger** to Russian integrity. The shifting of budgetary priorities to meet the war economy goals, in conjunction with anticipated progressively **lower** energy-borne **revenues**, resistance to mobilization of the part of the population for war needs and frustration with the war constitute a context more conducive to **political** **turmoil**, resistance and **pressures** to the **regime** (Lieven, 2022).

**Perception triggers financial shocks.**

**Baltvilks 22** [Witajewski; Expert @ the Centre for Climate and Energy Analyses @ the Polish National Centre for Emission Management; April 26; euractiv; “How the green paradox and climatepolicy can become Putin’s nightmare,” https://www.euractiv.com/section/energy/opinion/how-the-green-paradox-and-climate-policy-can-become-putins-nightmare/; DOA: 3-21-2025] tristan

**Russia’s** **invasion** of Ukraine **pushed** global **oil** and **gas** **prices** even **higher** than they stood in 2021 because of the Russian **export** **restriction**. Many experts believe that further sanctions on Russia, including the gradual isolation of Russia in the sphere of global trade, would **keep** oil and gas **prices** **high** in the medium term.

Ironically, **high** global **prices** **imply** that many Asian **countries** are more likely to **purchase** Putin’s **oil**, especially if it is **offered** at a **lower** **price**. Should this happen, Putin’s oil revenues will remain high, and sanctions by G7 countries will not achieve their primary goal.

This risk can be avoided if sanctions are complemented by a firm climate policy.

The ability of climate policy to influence the oil market and oil prices is illustrated in the so-called green paradox. The green paradox is a hypothetical scenario in which the **announcement** of a rigid **climate** **policy** becomes a **signal** for **oil** **producers** that the **demand** for oil will **end** **soon**, motivating them to **sell** as **much** as they **can** as soon as they can.

**Flooding** the **market** with oil **depresses** its **price** and **incentivises** **consumers** to **use** **more**. If this were to happen, emissions would increase, **rendering** the climate **policy** **ineffective**. The green paradox is particularly relevant in the context of oil markets, but the mechanisms of the paradox can also apply to natural gas and coal.

Until recently, the green paradox was a problem for climate change economists, but the one who should be most concerned is, in fact, Vladimir Putin. The green paradox has the potential to turn radical climate policy into a weapon against Putin’s regime. It is especially important because Russia, the second-largest worldwide gas producer and the third-largest oil producer, currently uses fossil fuels as a weapon against the West for the purpose of pacification.

A **clear** and credible **commitment** by the largest economies in the world to halve the consumption of oil over the next two decades would be a **clear** **signal** to all oil producers that their **resources** will soon **lose** **value**. **No** **producer** with low extraction costs will **keep** its **reserves** for the **future** — they will **attempt** to **pump** their **oil** into the market as long as it **exists**.

**Low**-**cost** oil from Saudi Arabia and the United Arab Emirates will, at least partly, **crowd** **out** the more **expensive** **product** from **Russia**, Venezuela and Iran. Even if that crowding out is not complete, the low oil price will **render** these countries’ **oil** **revenues** **negligible**. In Russia, where **oil** **rents** constitute more than **9% of** the nation’s **GDP** (**36%** of public-sector **revenue**), this will unavoidably **complicate** the **financial** **landscape** of the regime.

**Nuclear is unique.**

**Adams 13** [Rod Adams; Reporter for the American Nuclear Society; 12-10-2013; "Do oil and gas suppliers worry about nuclear energy development?"; Nuclear Newswire; https://www.ans.org/news/article-1481/do-oil-and-gas-suppliers-worry-about-nuclear/; accessed 03-04-2025] leon

That is the most important take away for attendees at the OPEC Embargo +40 summit held in Washington DC on October 16. Unfortunately, the meeting sponsors avoided acknowledging that nuclear energy is the **alternative** energy source that **most worries** established **hydrocarbon suppliers**. Nuclear has held that position since the early 1960s, when General Electric first won a head-to-head competition against coal to sell the Oyster Creek nuclear power plant.

Nuclear energy is **reliable**, virtually **emission-free**, and uses a **widely distributed**, **abundant** fuel source that is **no longer subject to influence** by the same producers that manipulate other fuel prices. Its cheap, clean heat can help turn coal, natural gas, and plants (vegetation) into liquid fuels that can be drop-in replacements for petroleum-based fuels.

**Decline causes great power war.**

**Kaplan 16** [Robert D. Kaplan; American author, Senior fellow at the Center for a New American Security; March/April 2016; "Eurasia’s Coming Anarchy"; Foreign Affairs; https://www.foreignaffairs.com/articles/china/2016-02-15/eurasias-coming-anarchy; access at https://archive.ph/YfaTO; accessed 03-29-2025] doobz

Not coincidentally, these military **adventures have accompanied** the sharp reversal of Russian economic power. In 2014, the price of oil collapsed, the countries of central and eastern Europe continued to wean themselves off Russian gas, slow global growth further reduced the appetite for Russian hydrocarbons and other natural resources, and the West levied damaging sanctions on Moscow. The result has been a full-blown economic crisis, with the ruble losing roughly half of its value against the U.S. dollar since 2014. That year, Russian GDP growth fell to nearly zero, and by the third quarter of 2015, the economy was shrinking by more than four percent. In the first eight months of 2015, capital investment declined by six percent and the volume of construction fell by eight percent.

Russia’s economic problems run deep, leaving its leaders with few easy options for fixing them. For decades, Russia has **relied on natural resource production** and a manufacturing sector that makes **consumer goods** for the domestic market (since few foreigners want to buy Russia’s nonmilitary products). Despite some pockets of ostentatious wealth, the service sector has remained **underdeveloped**. Because Putin and his camarilla never built civil institutions or a truly free market, the corrupt, gangster-led economy of Russia today exhibits eerie similarities to the old Soviet one.

Back in the 1980s, when that economy was hit by a crisis, Mikhail Gorbachev responded by opening up the political system—only to be rewarded with anarchy and the collapse of Russia’s empire. Putin learned this lesson well and is determined to do the opposite: keep the political system closed while distracting the masses with displays of Russian power in the near abroad. Putin is a former intelligence agent, not a former apparatchik. Thus, although he nurses historical grudges concerning Russia’s place in the world, he is not deceiving himself about Russia’s internal problems. As the Russian economy decays further, Putin **surely knows** that for the sake of **domestic approval**, his foreign policy must become more creative and calculating, even deceptively conciliatory at moments. Over time, expect him to find new ways to undermine NATO and the EU, even as he claims to be helping the West fight the Islamic State, or ISIS. For the **more chaos** he can generate **abroad**, the **more valuable** the autocratic **stability** he provides at home will **appear**. Russians may know in the abstract that a freer society is preferable, but they fear the risks of such a transition.

Try as he might, however, Putin will not be able to shelter his regime from the fallout of economic collapse. Desperation will spawn infighting among a ruling elite that has grown used to sharing generous spoils. Given the absence of strong institutions, as well as the brittle and highly centralized nature of the regime, a **coup** like the one that toppled Nikita Khrushchev in 1964 cannot be **ruled out**; Russia remains Soviet in its style of governance. The country has experienced the crumbling of autocracy followed by chaos before (as during and after the 1917 revolutions), and it’s possible that enough turmoil could cause Russia to fragment yet again. The heavily Muslim North Caucasus, along with areas of Russia’s Siberian and Far Eastern districts, distant from the center and burdened by bloody politics, may begin loosening their ties to Moscow in the event of instability inside the Kremlin itself. The result could be Yugoslavia lite: **violence and separatism** that begin in one place and spread **elsewhere**. As Moscow loses control, the **global jihadist movement could take advantage** of the vacuum and come to Russia’s outlying regions and to Central Asia.

Bad as this sounds, things could still get worse. Back in 1991, the Polish intellectual Adam Michnik predicted that future leaders in Russia and eastern Europe would fill the gap left by the collapse of communism with “a coarse and primitive nationalism.” Putin has adopted just such a **nationalism** in recent years. He has slyly backed separatist movements in Abkhazia, the Donbas, Nagorno-Karabakh, South Ossetia, and Transnistria, creating deniable conflicts that result in warlord-run statelets. In the years ahead, he may well choose to provoke more of these so-called frozen conflicts, but this time in **NATO Baltic member states** (which have sizable Russian populations and which Moscow still considers lost provinces). Meanwhile, Putin will try to play on Europe’s need for Russian support in Syria to force Europe to acknowledge his annexation of Crimea and his de facto rule over eastern Ukraine.

**Extinction!**

**Clare 23** [Stephen Clare; Effective Altruism writer and existential risks researcher; June 2023; "Great power war"; 80000 Hours; https://80000hours.org/problem-profiles/great-power-conflict/; accessed 12-05-2024, BZ + Willie T. + sumzom]

A modern great power war could see **nuclear weapons**, **bioweapons**, **autonomous weapons**, and other destructive **new** technologies deployed on an unprecedented scale.

It would probably be the most destructive event in history, shattering our world. It could even threaten us with **extinction**.

<<TEXT CONDENSED NONE OMITTED>>

We’ve come perilously close to just this kind of catastrophe before.¶ On October 27, 1962 — near the peak of the Cuban Missile Crisis — an American U-2 reconnaissance plane set out on a routine mission to the Arctic to collect data on Soviet nuclear tests. But, while flying near the North Pole, with the stars obscured by the northern lights, the pilot made a navigation error and strayed into Soviet airspace.1¶ Soviet commanders sent fighter jets to intercept the American plane. The jets were picked up by American radar operators and nuclear-armed F-102 fighters took off to protect the U-2.¶ Fortunately, the reconnaissance pilot realised his error with enough time to correct course before the Soviet and American fighters met. But the intrusion enraged Soviet Premier Nikita Khrushchev, who was already on high alert amidst the crisis in Cuba.¶ “What is this, a provocation?” Khrushchev wrote to US President John F. Kennedy. “One of your planes violates our frontier during this anxious time when everything has been put into combat readiness.”¶ If the U-2’s path had strayed further west, or the Soviet fighters had been fast enough to intercept it, this incident could have played out quite differently. Both the United States and the USSR had thousands of nuclear missiles ready to fire. Instead of a nearly-forgotten anecdote, the U-2 incident could have been a trigger for war, like the assassination of Franz Ferdinand.

<<LINE BREAKS CONTINUE>>

**Competition** among the world’s most powerful countries shapes our world today. And whether it’s through future incidents like the lost U-2, or something else entirely, it’s plausible that it could **escalate** and lead to a major, devastating war.

Is there anything you can do to help avoid such a terrible outcome? It is, of course, difficult to imagine how any one individual can hope to influence such world-historical events. Even the **most powerful** world leaders often **fail to predict** the global consequences of their decisions.

But I think the **likelihood** and **severity** of great power war makes this among the **most pressing problems** of our time — and that some solutions could be impactful enough that working on them may be one of the highest-impact things to do with your career.

By taking action, I think we can create a future where the threat of great power war is a distant memory rather than an ever-present danger.

Summary

Economic **growth** and **technological progress** have **bolstered** the arsenals of the world’s most powerful countries. That means the next war between them could be far worse than World War II, the deadliest conflict humanity has yet experienced.

Could such a war actually occur? We can’t rule out the possibility. Technical **accidents** or diplomatic **misunderstandings** could spark a conflict that **quickly escalates**. Or international **tension** could cause leaders to decide they’re **better off fighting than negotiating**.

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It seems hard to make progress on this problem. It’s also less neglected than some of the problems that we think are most pressing. There are certain issues, like making nuclear weapons or military artificial intelligence systems safer, which seem promising — although it may be more impactful to work on reducing risks from AI, bioweapons or nuclear weapons directly. You might also be able to reduce the chances of misunderstandings and miscalculations by developing expertise in one of the most important bilateral relationships (such as that between the United States and China).¶ Finally, by making conflict less likely, reducing competitive pressures on the development of dangerous technology, and improving international cooperation, you might be helping to reduce other risks, like the chance of future pandemics.¶ Our overall view¶ Recommended¶ Working on this issue seems to be among the best ways of improving the long-term future we know of, but all else equal, we think it’s less pressing than our highest priority areas (primarily because it seems less neglected and harder to solve).¶ Scale ¶ There’s a significant chance that a new great power war occurs this century.¶ Although the world’s most powerful countries haven’t fought directly since World War II, war has been a constant throughout human history. There have been numerous close calls, and several issues could cause diplomatic disputes in the years to come.¶ These considerations, along with forecasts and statistical models, lead me to think there’s about a one-in-three chance that a new great power war breaks out in roughly the next 30 years.¶ Few wars cause more than a million casualties and the next great power war would probably be smaller than that. However, there’s some chance it could escalate massively. Today the great powers have much larger economies, more powerful weapons, and bigger military budgets than they did in the past. An all-out war could kill far more people than even World War II, the worst war we’ve yet experienced.¶ Could it become an existentially threatening war — one that could cause human extinction or significantly damage the prospects of the long-term future? It’s very difficult to say. But my best current guess is that the chance of an existential catastrophe due to war in the next century is somewhere between 0.05% and 2%.¶ Neglectedness ¶ War is a lot less neglected than some of our other top problems. There are thousands of people in governments, think tanks, and universities already working on this problem. But some solutions or approaches remain neglected. One particularly promising approach is to develop expertise at the intersection of international conflict and another of our top problems. Experts who understand both geopolitical dynamics and risks from advanced artificial intelligence, for example, are sorely needed.¶ Solvability ¶ Reducing the risk of great power war seems very difficult. But there are specific technical problems that can be solved to make weapons systems safer or less likely to trigger catastrophic outcomes. And in the best case, working on this problem can have a leverage effect, making the development of several dangerous technologies safer by improving international cooperation and making them less likely to be deployed in war.¶ At the end of this profile, I suggest five issues which I’d be particularly excited to see people work on. These are:¶ Developing expertise in the riskiest bilateral relationships¶ Learning how to manage international crises quickly and effectively and ensuring the systems to do so are properly maintained¶ Doing research to improve particularly important foreign policies, like strategies for sanctions and deterrence¶ Improving how nuclear weapons and other weapons of mass destruction are governed at the international level¶ Improving how such weapons are controlled at the national level¶ Profile depth¶ In-depth ¶ This is one of many profiles we've written to help people find the most pressing problems they can solve with their careers. Learn more about how we compare different problems, see how we try to score them numerically, and see how this problem compares to the others we've considered so far.¶ Why might preventing great power war be an especially pressing problem?¶ A modern great power war — an all-out conflict between the world’s most powerful countries — could be the worst thing to ever happen to humanity.¶ Historically, such wars have been exceptionally destructive. Sixty-six million people died in World War II, likely the deadliest catastrophe humanity has experienced so far.¶ Since World War II, the global population and world economy have continued to grow, nuclear weapons have proliferated, and military technology has continued to advance. This means the next world war could be even worse, just as World War II was much deadlier than World War I.¶ It’s not guaranteed that such a war will break out. And if it does, it may not escalate to such a terrible extent. But the chance can’t be ignored. In fact, there are reasons to think that the odds of World War III breaking out this century are worryingly high.¶ A modern great power war would be devastating for people alive today. But its effects could also persist long into the future. That’s because there is a substantial chance that this century proves to be particularly important. Technologies with the potential to cause a global catastrophe or radically reshape society are likely to be invented. How we choose to develop and deploy them could impact huge numbers of our descendants. And these choices would be affected by the outcomes of a major war.¶ To be more specific, there are three main ways great power conflict could affect the long-term future:¶ High international tension could increase other risks. Great power tensions could make the world more dangerous even if they don’t lead to war. During the Cold War, for example, the United States and the USSR never came into direct conflict but invested in bioweapons research and built up nuclear arsenals. This dynamic could return, with tension between great powers fueling races to develop and build new weapons, raising the risk of a disaster even before shots are fired.¶ War could cause an existential catastrophe. If war does break out, it could escalate dramatically, with modern weapons (nuclear weapons, bioweapons, autonomous weapons, or other future technologies) deployed at unprecedented scale. The resulting destruction could irreparably damage humanity’s prospects.¶ War could reshape international institutions and power balances. While such a catastrophic war is possible, it seems extremely unlikely. But even a less deadly war, such as another conflict on the scale of World War II, could have very long-lasting effects. For example, it could reshape international institutions and the global balance of power. In a pivotal century, different institutional arrangements and geopolitical balances could cause humanity to follow different long-term trajectories.¶ The rest of this profile explores exactly how pressing a problem great power conflict is. In summary:¶ Great power relations have become more tense. (More.)¶ Partly as a result, a war is more likely than you might think. It’s reasonable to put the probability of such a conflict in the coming decades somewhere between 10% and 50%. (More.)¶ If war breaks out, it would probably be hard to control escalation. The chance that it would become large enough to be an existential risk cannot be dismissed. (More.)¶ This makes great power war one of the biggest threats our species currently faces. (More.)¶ It seems hard to make progress on solving such a difficult problem (more) — but there are many things you can try if you want to help (more).¶ International tension has risen and makes other problems worse¶ Imagine we had a thermometer-like device which, instead of measuring temperature, measured the level of international tension.2 This ‘tension metre’ would max out during periods of all-out global war, like World War II. And it would be relatively low when the great powers3 were peaceful and cooperative. For much of the post-Napoleonic 1800s, for example, the powerful European nations instituted the Concert of Europe and mostly upheld a continental peace. The years following the fall of the USSR also seem like a time of relative calm, when the tension metre would have been quite low.4¶ How much more worried would you be about the coming decades if you knew the tension metre would be very high than if you knew it would be low? Probably quite a lot. In the worst case, of course, the great powers could come into direct conflict. But even if it doesn’t lead to war, a high level of tension between great powers could accelerate the development of new strategic technologies, make it harder to solve global problems like climate change, and undermine international institutions.¶ During the Cold War, for instance, the United States and USSR avoided coming into direct conflict. But the tension metre would still have been pretty high. This led to some dangerous events:¶ A nuclear arms race. The number of nuclear warheads in the world grew from just 300 in 1950 to over 64,000 in 1986.¶ The development of new bioweapons. Despite signing the Biological Weapons Convention in 1972, the search for military advantages motivated Soviet decision makers to continue investing in bioweapon development for decades. Although never used in combat, biological agents were accidentally released from research facilities, resulting in dozens of deaths and threatening to cause a pandemic.5¶ Nuclear close calls. Military accidents and false alarms happened regularly, and top decision makers were more likely to interpret these events hostilely when tensions were high. On several occasions it seems the decision about whether or not to start a nuclear war came down to individuals acting under stress and with limited time.¶ This makes international tension an existential risk factor. It’s connected to a number of other problems, which means reducing the level of international tension would lower the total amount of existential risk we face.¶ The level of tension today¶ Recently, international tension seems to have once again been rising. To highlight some of the most salient examples:¶ China-United States relations have deteriorated, leading to harsh diplomatic rhetoric and protectionist trade policies that aim to reduce the countries’ economic interdependence.¶ Russia’s invasion of Ukraine has killed about a hundred thousand people so far, raised the risk of nuclear war, and sent United States-Russia relations to their lowest point since the Cold War.¶ Chinese and Indian soldiers fought deadly skirmishes along their countries’ disputed border in 2020–21.¶ These dynamics raise an important question: how much more dangerous is the world given this higher tension than it would be in a world of low tension?¶ I think the answer is quite a bit more dangerous — for several reasons. First, international tension seems likely to make technological progress more dangerous. There’s a good chance that, in the coming decades, humanity will make some major technological breakthroughs. We’ve discussed, for example, why one might worry about the effects of advanced artificial intelligence systems or biotechnology. The level of tension could strongly affect how these technologies are developed and governed. Tense relations could, for example, cause countries to neglect safety concerns in order to develop technology faster.6¶ Second, great power relations will strongly influence how nations do, or do not, cooperate to solve other global collective action problems. For example, in 2022, China withdrew from bilateral negotiations with the United States over climate action in protest of what it perceived as American diplomatic aggression in Taiwan. That same year, efforts to strengthen the Biological Weapons Convention were reportedly hampered by the Russian delegation after their country’s invasion of Ukraine raised tensions with the United States and other western countries.¶ And third, if relations deteriorate severely, the great powers could fight a war.¶ How likely is a war?¶ Wars are destructive and risky for all countries involved. Modern weapons, especially nuclear warheads, make starting a great power war today seem like a suicidal undertaking.¶ But factors like the prevalence of war throughout history, the chance that leaders make mistakes, conflicting ideologies, and commitment problems, make me think that conflict could break out anyway.¶ On balance, I think such an event is somewhat unlikely but hardly unthinkable. To quantify this: I put the chance we experience some kind of war between great powers before 2050 at about one-in-three.7¶ War has occurred regularly in the past¶ One reason to think a war is quite likely is that such conflicts have been so common in the past. Over the past 500 years, about two great power wars have occurred per century.8¶ Naively, this would mean that every year there’s a 2% chance such a war occurs, implying the chance of experiencing at least one great power war over the next 80 years — roughly until the end of the century — is about 80%.9¶ This is a very simple model. In reality, the risk is not constant over time and independent across years. But it shows that if past trends simply continue, the outcome is likely to be very bad.¶ Has great power war become less likely?¶ One of the most important criticisms of this model is that it assumes the risk is constant over time. Some researchers have argued instead that, especially since the end of World War II, major conflicts have become much less likely due to:¶ Nuclear deterrence: Nuclear weapons are so powerful and destructive that it’s just too costly for nuclear-armed countries to start wars against each other.10¶ Democratisation: Democracies have almost never gone to war against each other, perhaps because democracies are more interconnected and their leaders are under more public pressure to peacefully resolve disputes with each other.11 The proportion of countries that are democratic has increased from under 10% in 1945 to about 50% today.¶ Strong economic growth and global trade: Global economic growth accelerated following World War II and the value of global exports grew by a factor of almost 30 between 1950 and 2014. Since war disrupts economies and international trade, strong growth raises the costs of fighting.12¶ The spread of international institutions: Multilateral bodies like the United Nations General Assembly and Security Council promote diplomatic dialogue and facilitate coordination to punish transgressors.13¶ It is true that we are living through an unusually long period of great power peace. It’s been about 80 years since World War II. We just saw that a simple model using the historical frequency of great power wars suggests there was only a 20% chance of going that long without at least one more war breaking out. This is some evidence in favour of the idea that wars have become significantly less common.¶ At the same time, we shouldn’t feel too optimistic.¶ The numerous close calls during the Cold War suggest we were somewhat lucky to avoid a major war in that time. And a 20% chance of observing 80 years of peace is not that low.14 Structural changes might have dramatically reduced the likelihood of war. Or perhaps we’ve just been lucky. It could even be that technological advances have made war less likely to break out, but more deadly when it occurs, leaving the overall effect on the level of risk ambiguous. It just hasn’t been long enough to support a decisive view.15¶ So while the recent historical trend is somewhat encouraging, we don’t have nearly enough data to be confident that great power war is a thing of the past. To better predict the likelihood of future conflict, we should also consider distinctive features of our modern world.16¶ One might think that a modern great power war would simply be so destructive that no state leader would ever choose to start one. And some researchers do think that the destruction such a war would wreak globally makes it less likely to occur. But it would be hard to find anyone who claims this dynamic has driven the risk to zero.¶ First, a war could be started by accident.¶ Second, sometimes even prudent leaders may struggle to avoid a slide towards war.¶ We could blunder into war¶ An accidental war can occur if one side mistakes some event as an aggressive action by an adversary.¶ This happened several times during the Cold War. The earlier example of the wayward American reconnaissance plane shows how routine military exercises carry some escalation risk. Similarly, throughout history, nervous pilots and captains have caused serious incidents by attacking civilian planes and ships.17 Nuclear weapons allow for massive retaliatory strikes to be launched quickly — potentially too quickly to allow for such situations to be explained and de-escalated.¶ It is perhaps more likely, though, that an accidental war could be triggered by a technological malfunction. Faulty computers and satellites have previously triggered nuclear close calls. As monitoring systems have become more reliable, the rate at which such accidents have occurred has been going down. But it would be overconfident to think that technological malfunctions have become impossible.¶ Future technological changes will likely raise new challenges for nuclear weapon control. There may be pressure to integrate artificial intelligence systems into nuclear command and control to allow for faster data processing and decision making. And AI systems are known to behave unexpectedly when deployed in new environments.18¶ New technologies will also create new accident risks of their own, even if they’re not connected to nuclear weapon systems. Although these risks are hard to predict, they seem significant. I’ll say more about how such technologies — including AI, nuclear, biological, and autonomous weapons — are likely to increase war risks later.¶ Leaders could choose war¶ All that said, most wars have not started by accident. If another great power war does break out in the coming decades, it is more likely to be an intentional decision made by a national leader.¶ Explaining why someone might make such a costly, destructive, unpredictable, and risky decision has been called “the central puzzle about war.” It has motivated researchers to search for “rationalist” explanations for war. In his 2022 book Why We Fight, for example, economist Chris Blattman proposes five basic explanations: unchecked interests, intangible incentives, uncertainty, commitment problems, and misperceptions.19¶ Blattman's Five (Rationalist) Explanations for War¶ This section discusses how great power tensions may escalate to war in the next few decades. It focuses on three potential conflicts in particular: war between the US and China, between the US and Russia, and between China and India. These are discussed because each of these countries are among the world’s largest economies and military spenders, and seem particularly likely to fight. At the end, I briefly touch on other potential large conflicts.¶ Projected real GDP of the US, China, India and Russia according to a 2022 Goldman Sachs analysis Source: Author’s figure using data from: Kevin Daly and Tadas Gedminas, “Global Economics Paper The Path to 2075 — Slower Global Growth, But Convergence Remains Intact,” Global Economics Paper (Goldman Sachs, December 6, 2022), https://www.goldmansachs.com/intelligence/pages/gs-research/the-path-to-2075-slower-global-growth-but-convergence-remains-intact/report.pdf.¶ United States-China¶ The most worrying possibility is war between the United States and China. They are easily the world’s largest economies. They spend by far the most on their militaries. Their diplomatic relations are tense and have recently worsened. And their relationship has several of the characteristics that Blattman identifies as causes of war.¶ At the core of the United States-China relationship is a commitment problem.¶ China’s economy is growing faster than the United States’. By some metrics, it is already larger.20 If its differential growth continues, the gap will continue to widen between it and the United States. While economic power is not the sole determinant of military power, it is a key factor.21¶ The United States and China may be able to strike a fair deal today. But as China continues to grow faster, that deal may come to seem unbalanced. Historically, such commitment problems seem to have made these kinds of transition periods particularly dangerous.22¶ In practice, the United States and China may find it hard to agree on rules to guide their interactions, such as how to run international institutions or govern areas of the world where their interests overlap.¶ The most obvious issue which could tip the United States-China relationship from tension into war is a conflict over Taiwan. Taiwan’s location and technology industries are valuable for both great powers.¶ This issue is further complicated by intangible incentives.¶ For the United States, it is also a conflict over democratic ideals and the United States’ reputation for defending its allies.¶ For China, it is also a conflict about territorial integrity and addressing what are seen as past injustices.¶ Still, forecasts suggest that while a conflict is certainly possible, it is far from inevitable. As of 8 June 2023, one aggregated forecast23 gives a 17% chance of a United States-China war breaking out before 2035.24¶ A related aggregated forecast of the chance that at least 100 deaths occur in conflict between China and Taiwan by 2050 gives it, as of 8 June 2023, a much higher 68% chance of occurring.25¶ United States-Russia¶ Russia is the United States’ other major geopolitical rival.¶ Unlike China, Russia is not a rival in economic terms: even after adjusting for purchasing power, its economy is only about one-fifth the size of the United States’.¶ However, Russia devotes a substantial fraction of its economy to its military. Crucially, it has the world’s largest nuclear arsenal. And Russian leadership has shown a willingness to project power beyond their country’s borders.¶ Country Military spending in 2021 (2020 USD, PPP adjusted)¶ United States 801 billion¶ China 293 billion¶ India 76.6 billion¶ United Kingdom 68.4 billion¶ Russia 65.9 billion¶ Top five countries by estimated military spending, 2021. Source: SIPRI¶ Russia’s 2022 invasion of Ukraine demonstrated the dangers of renewed rivalry between Russia and the United States-led West. The war has already been hugely destructive: the largest war in Europe since World War II, with hundreds of thousands of casualties already and no end to the conflict in sight. And it could get much worse. Most notably, Russian officials have repeatedly refused to rule out the use of nuclear weapons.¶ Unchecked interests and intangible incentives are again at play here. Vladimir Putin leads a highly-centralised government. He has spoken about how his desire to rebuild Russia’s reputation played in his decision to invade Ukraine.¶ Given their ideological differences and history of rivalry, it is reasonable to expect that the United States and Russia will continue to experience dangerous disagreements in the future. As of 8 June 2023, an aggregated forecast gives a 20% chance that the United States and Russia will fight a war involving at least 1,000 battle deaths before 2050.¶ China-India¶ India is already the world’s third-largest economy. If national growth rates remain roughly constant, the size of the Indian economy will surpass that of the United States’ sometime this century. India also has nuclear weapons and is already the world’s third-largest military spender (albeit at a much lower level than China or the United States).¶ One reason to worry that China and India could fight a war is that they already dispute territory along their border. Countries that share a border, especially when it is disputed, are more likely to go to war than countries that do not. By one count, 88% of the wars that occurred between 1816 and 1980 began as wars between neighbours.26¶ In fact, China and India already fought a brief but violent border war in 1962. Deadly skirmishes have continued since, resulting in deaths as recently as 2020.¶ Forecasters agree that a China-India conflict seems relatively (though not absolutely) likely. An aggregated forecast gives a 19% chance of war before 2035.¶ Other dangerous conflicts¶ These three conflicts — United States-China, United States-Russia, and China-India — are not the only possible great power wars that could occur. Other potential conflicts could also pose existential risk, either because they drive dangerous arms races or see widespread deployment of dangerous weapons.¶ We should keep in mind India-Pakistan as a particularly likely conflict between nuclear-armed states and China-Russia as a potential, though unlikely, conflict between great powers with a disputed border and history of war. Plus, new great powers may emerge or current great powers may fade in the years to come.¶ While I think we should prioritise the three potential conflicts I’ve highlighted above, the future is highly uncertain. We should monitor geopolitical changes and be open to changing our priorities in the future.¶ Overall predictions¶ Below is a table listing relevant predictions from the forecasting platform Metaculus, including the number of predictions made, as of 10 March 2023. Note the different timescales and resolution criteria for each question; they may not be intuitively comparable.¶ Prediction Resolution criteria Number of predictions Metaculus prediction¶ World war by 2151 Either:¶ A war killing >0.5% of global population, involving >50% of countries totalling >50% of global population from at least 4 continents.¶ Or:¶ A war killing at least >1% of global population, involving >10% of countries totalling >25% of global population¶ 561 52%¶ World War III before 2050 Involving countries >30% of world GDP OR >50% of world population¶ AND¶ >10M deaths¶ 1640 20%¶ Global thermonuclear war by 2070 EITHER:¶ 3 countries each detonate at least 10 nuclear warheads of at least 10 kt yield outside of their territory¶ OR¶ 2 countries each detonate at least 50 nuclear warheads of at least 10 kt outside of their territory¶ 337 11%¶ When will be the next great power war? Any two of the top 10 nations by military spending are at war¶ “At war” definition:¶ EITHER¶ Formal declaration¶ OR¶ Territory occupied AND at least 250 casualties¶ OR¶ Media sources describe them as “at war”¶ 25th percentile: 2031¶ Median: 2048¶ 75th percentile: 2088¶ Never (not before 2200): 8%¶ No non-test nuclear detonations before 2035 No nuclear detonation other than controlled test¶ [Note the negation in the question. It resolves negatively if a warhead is detonated]¶ 321 69%¶ At least 1 nuclear detonation in war by 2050 Resolves according to credible media reports 476 31%¶ I have previously independently estimated the likelihood of seeing a World War III-like conflict this century. My calculation first adjusts historical base rates to allow for the possibility that major wars have become somewhat less likely, and uses the adjusted base rate to calculate the probability of seeing a war between now and 2100.¶ This method gives a 45% chance of seeing a major great power war in the next 77 years. If the probability is constant over time then the cumulative probability between now and 2050 would be 22%. This is aligned with the Metaculus predictions above.¶ We can also ask experts what they think. Unfortunately, there are surprisingly few expert predictions about the likelihood of major conflict. One survey was conducted by the Project for the Study of the 21st Century. The numbers were relatively aligned with the Metaculus forecasts, though slightly more pessimistic. However, it seems a mistake to put too much stock in this survey (see footnote).27¶ We now have at least a rough sense of a great power war’s probability. But how bad could it get if it occurred?¶ A new great power war could be devastating¶ At the time, the mechanised slaughter of World War I was a shocking step-change in the potential severity of warfare. But its severity was surpassed just 20 years later by the outbreak of World War II, which killed more than twice as many people.¶ A modern great power war could be even worse.¶ How bad have wars been in the past?¶ The graph below shows how common wars of various sizes are, according to the Correlates of War’s Interstate War dataset.28¶ The x-axis here represents war size in terms of the logarithm of the number of battle deaths. The y-axis represents the logarithm of the proportion of wars in the dataset that are at least that large.¶ Using logarithms means that each step to the right in the graph represents a war not one unit larger, but 10 times larger. And each step up represents a war that is not one unit more likely, but 10 times more likely.¶ Cumulative frequency distribution of severity of interstate wars, 1816-2007 Source: Author’s figure. See the data here. Data source: Correlates of War Interwar dataset, v4.029¶ What the graph shows is that wars have a heavy tail. Most wars remain relatively small. But a few escalate greatly and become much worse than average.¶ Of the 95 wars in the latest version of the database, the median battle death count is 8,000. But the heavy tail means the average is 334,000 battle deaths. And the worst war, World War II, had almost 17 million battle deaths.30¶ The number of battle deaths is only one way to measure the badness of wars. We could also consider the proportion of the population of the countries involved who were killed in battle. By this measure, the worst war since 1816 was not World War II. Instead, it’s the Paraguayan War of 1864–70. In that war, 30 soldiers died for every 1,000 citizens of the countries involved. It’s even worse if we also consider civilian deaths; while estimates are very uncertain, it’s plausible that about half of the men in Paraguay, or around a quarter of the entire population, was killed.31¶ What if instead we compared wars by the proportion of the global population killed? World War II is again the worst conflict since 1816 on this measure, having killed about 3% of the global population. Going further back in time, though, we can find worse wars. Ghengis Khan’s conquests likely killed about 9.5% of people in the world at the time.¶ The heavy tail means that some wars will be shockingly large.32 The scale of World War I and World War II took people by surprise, including the leaders who initiated it.¶ It’s also hard to know exactly how big wars could get. We haven’t seen many really large wars. So while we know there’s a heavy tail of potential outcomes, we don’t know what that tail looks like.¶ That said, there are a few reasons to think that wars much worse than World War II are possible:¶ We’re statistically unlikely to have brushed up against the end of the tail, even if the tail has an upper bound.¶ Other wars have been deadlier on a per-capita basis. So unless wars involving countries with larger populations are systematically less intense, we should expect to see more intense wars involving as many people as World War II.¶ Economic growth and technological progress are continually increasing humanity’s war-making capacity. This means that, once a war has started, we’re at greater risk of extremely bad outcomes than we were in the past.¶ So how bad could it get?¶ How bad could a modern great power war be?¶ Over time, two related factors have greatly increased humanity’s capacity to make war. 33¶ First, scientific progress has led to the invention of more powerful weapons and improved military efficiency.¶ Second, economic growth has allowed states to build larger armies and arsenals.¶ Since World War II, the world economy has grown by a factor of more than 10 in real terms; the number of nuclear weapons in the world has grown from basically none to more than 9,000, and we’ve invented drones, missiles, satellites, and advanced planes, ships, and submarines.

Ghengis Khan’s conquests killed about 10% of the world, but this took place over the course of two decades. Today that proportion may be killed in a matter of hours.

First, nuclear weapons could be used.

Today there are around 10,000 nuclear warheads globally.34 At the peak of nuclear competition between the United States and the USSR, though, there were 64,000. If arms control agreements break down and competition resurges among two or even three great powers, nuclear arsenals could expand. In fact, China’s arsenal is very likely to grow — though by how much remains uncertain.

Many of the nuclear weapons in the arsenals of the great powers today are at least 10 times more powerful than the atomic bombs used in World War II.35 Should these weapons be used, the consequences would be catastrophic.

By any measure, such a war would be by far the **most destructive**, dangerous event in human history, with the potential to cause billions of deaths.

The probability that it would, on its own, lead to humanity’s **extinction** or unrecoverable collapse, is contested. But there seems to be some possibility — whether through a **famine** caused by **nuclear winter**, or by **reducing** humanity’s resilience enough that something else, like a **catastrophic pandemic**, would be far more likely to reach **extinction**-levels (read more in our problem profile on nuclear war).

**Nuclear weapons** are **complemented** and **amplified** by a **variety** of other **modern military** technologies, including **improved missiles**, **planes**, **submarines**, and **satellites**. They are **also not** the only **military technology** with the **potential** to cause a **global catastrophe** — **bioweapons**, too, have the potential to cause massive harm through accidents or unexpected effects.

## 2NC

### AT: Climate Change

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<<FOR REFERENCE>>

Pushker Kharecha and James **Hansen 13** observe, 4-22-2013, "Coal and gas are far more harmful than

nuclear power – Climate Change: Vital Signs of the Planet," Climate Change: Vital Signs of the Planet, https://climate.nasa.gov/news/903/coal-and-gas-arefar-more-harmful-than-nuclear-power/

Likewise, we calculated that nuclear power prevented an average of 64 gigatonnes of CO2-equivalent (GtCO2-eq) net GHG emissions globally between 1971-2009 (see Fig. 3). This is about 15 times more emissions than it caused. It is equivalent to the past 35 years of CO2 emissions from coal burning in the U.S. or 17 years in China (ref. 3) — i.e., **historical nuclear energy production has prevented the building of hundreds of large coal-fired power plants.** To compute potential future effects, we started with the projected nuclear energy supply for 2010-2050 from an assessment made by the UN International Atomic Energy Agency that takes into account the effects of the Fukushima accident (ref. 4). We assume that the projected nuclear energy is canceled and replaced entirely by energy from either coal or natural gas. We calculate that this nuclear phaseout scenario leads to an average of 420,000-7 million deaths and 80-240 GtCO2-eq emissions globally (the high-end values reflect the all coal case; see Figs. 1 and 3). This emissions range corresponds to 16-48% of the "allowable" cumulative CO2 emissions between 2012-2050 if the world chooses to aim for a target atmospheric CO2 concentration of 350 ppm by around the end of this century (ref. 5). In other words, **projected nuclear power could reduce the CO2 mitigation burden for meeting this target by as much as 48%.**

**2. T - Affirming trades off with renewables, is less effective, and lacks economic viability.**

**Lovins 21** [Amory B. Lovins, adjunct professor of civil and environmental engineering @ Stanford 12-17-2021, Why Nuclear Power Is Bad for Your Wallet and the Climate, Bloomberg, https://news.bloomberglaw.com/environment-and-energy/why-nuclear-power-is-bad-for-your-wallet-and-the-climate, Willie T.]

Making 10% of world and 20% of U.S. commercial electricity, nuclear power is historically significant but now stagnant. In 2020, its global capacity additions minus retirements totaled only 0.4 GW (billion watts). Renewables in contrast added 278.3 GW—782x more capacity—able to produce about 232x more annual electricity (based on U.S. 2020 performance by technology). Renewables swelled supply and displaced carbon as much **every 38 hours** as nuclear did **all year.** As of early December, 2021’s score looks like nuclear –3 GW, renewables +290 GW. Game over.

The world already invests annually $0.3 trillion each, mostly voluntary private capital, in energy efficiency and renewables, but about $0.015–0.03 trillion, or 20–40x less, in nuclear—mostly conscripted, because investors got burned. Of 259 US power reactors ordered (1955–2016), only 112 got built and 93 remain operable; by mid-2017, **just 28 stayed** competitive and suffered no year-plus outage. In the oil business, that’s called an 89% dry-hole risk.

Renewables provided all global electricity growth in 2020. Nuclear power **struggles to sustain its miniscule marginal share** as its vendors, culture, and prospects shrivel. World reactors average 31 years old, in the U.S., 41. Within a few years, old and uneconomic reactors’ retirements will consistently eclipse additions, tipping output into permanent decline. World nuclear capacity already fell in five of the past 12 years for a 2% net drop. Performance has become erratic: the average French reactor in 2020 produced nothing one-third of the time.

China accounts for most current and projected nuclear growth. Yet China’s 2020 renewable investments about matched its cumulative 2008–20 nuclear investments. Together, in 2020 in China, **sun and wind generated twice nuclear’s output**, adding 60x more capacity and 6x more output at 2–3 times lower forward cost per kWh. Sun and wind are now the cheapest bulk power source for over 91% of world electricity.

Nuclear Power Has No Business Case

Nuclear power has bleak prospects because it has no business case. New plants cost 3–8x or 5–**13x more** per kWh than unsubsidized new solar or windpower, so new nuclear power produces 3–13x fewer kWh per dollar and therefore displaces 3–**13x less carbon** per dollar than new renewables. Thus buying nuclear makes climate change worse. End-use efficiency is even cheaper than renewables, hence even more climate-effective. Arithmetic is not an opinion.

Unsubsidized efficiency or renewables even beat most existing reactors’ operating cost, so a dozen have **closed** over the past decade. Congress is trying to rescue the others with a $6 billion lifeline and durable, generous new operating subsidies to replace or augment state largesse—adding to existing federal subsidies that rival or exceed nuclear construction costs.

But no business case means **no climate case**. Propping up obsolete assets so they don’t exit the market blocks more climate-effective replacements—efficiency and renewables that save even more carbon per dollar. Supporters of new subsidies for the sake of the climate **just got played.**

Fashionably rebranded “**Small Modular” or “Advanced” reactors can’t change the outcome**. Their smaller units cost less but **output falls even more**, so SMRs save money only in the sense in which a smaller helping of foie gras helps you lose weight.

They’ll initially at least **double existing reactors’ cost** per kWh; that cost is ~3–13x renewables’ (let alone efficiency’s); and renewables’ costs will halve again before SMRs can scale. Do the math: 2 x (3 to 13) x 2 = 12–52-fold. Mass production **can’t bridge** that huge cost gap—nor could SMRs scale before renewables have decarbonized the US grid.

Even free reactors **couldn’t compete**: their non-nuclear parts cost too much. Small Modular Renewables are decades ahead in exploiting mass-production economies; nuclear can never catch up. It’s not just too little, too late: nuclear **hogs market space**, **jams grid** capacity, and **diverts investments** that more-climate-effective carbon-free competitors then can’t contest.

**3. T - Uranium and released vapors increase emissions.**

**Jacobson 24** [Mark Z. Jacobson, Professor of Civil and Environmental Engineering @ Stanford, 10-10-2024, 7 reasons why nuclear energy is not the answer to solve climate change, One Earth, https://www.oneearth.org/the-7-reasons-why-nuclear-energy-is-not-the-answer-to-solve-climate-change/, Willie T.]

6. Carbon-Equivalent Emissions and Air Pollution

There is **no such thing** as a zero- or close-to-zero emission nuclear power plant. Even existing plants emit due to the **continuous mining and refining of uranium** needed for the plant. Emissions from new nuclear are 78 to 178 g-CO2/kWh, **not close to 0.** Of this, 64 to 102 g-CO2/kWh over 100 years are emissions from the background grid while consumers wait 10 to 19 years for nuclear to come online or be refurbished, relative to 2 to 5 years for wind or solar. In addition, all nuclear plants emit 4.4 g-CO2e/kWh from the **water vapor and heat they release**. This **contrasts** with solar panels and wind turbines, **which reduce** heat or water vapor fluxes to the air by about 2.2 g-CO2e/kWh for a **net difference** from this factor alone of **6.6 g-CO2e/kWh.**

In fact, China’s investment in nuclear plants that **take so long** between planning and operation instead of wind or solar resulted in China’s CO2 emissions **increasing 1.3 percent** from 2016 to 2017 **rather than declining** by an estimated average of 3 percent. The resulting difference in air pollution emissions may have caused **69,000 additional air pollution deaths** in China in 2016 alone, with additional deaths in years prior and since.

**4. NL - Green power fails AND is solved now.**

**Meyer 19** [Robinson Meyer, Former Staff Writer @ the Atlantic, 3-5-2019, The Atlantic, There Really, Really Isn’t a Silver Bullet for Climate Change, https://www.theatlantic.com/science/archive/2019/03/why-nuclear-power-cannot-solve-climate-change-alone/584059/, DOA: 3-26-2025]

But you can’t put a nuclear reactor in a tractor-trailer or a steel plant. Nuclear can only reduce emissions from the power sector, and “the energy system is **bigger than just electricity**,” says Sam Ori, the executive director of the Energy Policy Institute at the University of Chicago. “While I think nuclear has real potential as a means to decarbonizing electricity, you **still have a lot of sectors** to worry about.”

In fact, electricity makes up a smaller and smaller part of the climate problem. Right now, the power sector contributes **only about a third** of annual U.S. carbon emissions related to energy production. When you factor in land change and agriculture (read: deforestation and all those pesky cows), electricity is responsible for only about **a quarter** of annual U.S. emissions. And its **share is declining**. Carbon emissions from the U.S. power sector have **fallen 28 percent** since 2005. Meanwhile, emissions from other parts of the economy—transportation, agriculture, industry—have fallen by only 5 percent.

“Even if you figure out electricity, you still have to **figure out industry**. You still have to figure out **transportation**,” Ori told me. Although we have partial answers to some of the problems posed by those sectors—everyone could buy electric cars, for instance, and charge them off the new nuclear-powered grid—we don’t have total ones. We still have no electrified way of moving around **freight**. Electrified **air travel** remains notional. All the nuclear plants in the world could not reduce the importance of oil in **steel production**. Solving all these problems will require some kind of public policy, Ori said; even electric cars won’t replace their gas-powered brethren without a regulatory nudge. Sullivan’s nuclear build-out has **nothing to say** about such challenges.

**5. NL - Thermal lag prevents solvency.**

**Karis ‘24** (Demetrios Karis, Adjunct Lecturer, Bentley University, 2024, EarthArXiv, “Civilization will Collapse (High Confidence): A Compendium of Relevant Biophysical, Political, Economic, Military, Health, and Psychological Information on Climate Change”, accessed 9-3-2024, https://eartharxiv.org/repository/object/6520/download/14052/) jordan

Over **90%** of the extra energy from global warming is taken up by the oceans. Although heat mixes rapidly down to about 150 feet, it can take over a thousand years for heat to mix completely throughout the ocean. This creates an **extreme thermal lag.** **Even if** we **completely eliminate** all **g**reen**h**ouse **g**a**s** **emissions** and remove millions of tons of **carbon dioxide** from the atmosphere, sea level will **continue to rise**, probably for **hundreds of years**, as the oceans will continue to **release the heat** they have been **accumulating.** Glaciers and **ice sheets will continue to melt**, while land and atmospheric **temperature** will drop **only slightly** during this time. We can prevent the world from heating up to an extreme state via rapid decarbonization, but **the earth will not cool by itself after we stop burning fossil fuels.** We can cool the earth via geoengineering, but without additional research and testing, this may have devastating consequences, as described in a separate section below.

### AT: Quantum Computing

**1. NU - Fears are overblown and companies solve.**

**Ramachandran 24** [Vijaya; Director for Energy & Development @ the Breakthrough Institute, Board Member of the Energy for Growth Hub, PhD in Business Economics from Harvard University; July 9; Breakthrough Institute; “Unmasking the Fear of AI’s Energy Demand,” https://thebreakthrough.org/journal/no-20-spring-2024/unmasking-the-fear-of-ais-energy-demand; DOA: 3-24-2025] tristan

In a detailed thread on X, MIT Innovation Fellow and former National Economic Council director Brian Deese argues that forecasters consistently overestimate electricity demand, in part because they emphasize static load growth over efficiency gains. Deese points out that in the early 2000s, analysts predicted surging electricity demand. Instead, U.S. electricity demand has stayed **flat** for two decades. And although data center energy use is increasing, energy intensity (energy use per computation) has decreased by **20%** every year since 2010. Nvidia—one of the largest companies designing graphics processing units (GPUs) for gaming, professional visualization, data centers, and automotive markets—is continuously improving the energy efficiency of its GPUs. Its new AI-training chip, Blackwell, for example, will use **25 times less** energy than its predecessor, Hopper. Deese points out that analysts may be double-counting energy use by data centers because technology companies initiate multiple queries in different utility jurisdictions to get the best rates.

A (carbon-heavy) query to ChatGPT suggests AI and data service providers have considerable room to **improve** the energy efficiency of data center infrastructure using various measures:

Virtualization and Consolidation: Virtualization technology can be used to consolidate servers and reduce the number of physical machines running. This can lead to significant energy savings by optimizing server utilization rates.

Efficient Cooling Systems: Cooling accounts for a substantial portion of a data center's energy consumption. Implementing efficient cooling techniques such as hot/cold aisle containment, using free cooling when ambient temperatures allow, and employing modern cooling technologies like liquid cooling can reduce energy usage.

Energy-Efficient Hardware: Energy-efficient servers, storage devices, and networking equipment can be a priority, as can the use of products with high energy efficiency ratings (such as ENERGY STAR certified devices), with use configurations optimized for lower power consumption.

Power Management Software: Power management tools and software can monitor and adjust power usage based on demand. This includes dynamically adjusting server power levels during periods of low activity (e.g., using power capping techniques).

Optimized Data Center Layout: Data center layouts can be designed to minimize energy waste and optimize airflow. This includes proper rack layout, efficient cable management, and ensuring equipment is placed to minimize cooling requirements.

Energy-Efficient Data Storage: Efficient data storage technologies and practices, such as data de-duplication and compression, can be used to reduce the overall storage footprint and associated energy requirements. Continuous monitoring and optimization will also help.

Electricity demand from electric vehicles (EVs) may prove to be comparable or even higher than that of AI. The Princeton REPEAT model estimates the demand for electricity in the United States at 391 TWh for EV transportation (light-duty vehicles and other electric transport) in 2030, which is similar to BCG’s 2030 estimates for data centers (320 - 390 TWh). Rystad Energy predicts EV usage will grow from 18.3 TWh to 131 TWh for the same period. Despite the additional energy demand, policymakers strongly encourage the purchase of EVs and the construction of charging infrastructure, while commentators seem relatively unconcerned about EV charging needs. This may be because EVs are seen to be filling an existing societal need for transportation, as well as a solution to the problem of climate change. Even though AI has potential to raise productivity and improve lives, it is a new and energy-intensive technology whose value runs counter to the priorities of the environmental community.

No matter the level of future AI use, AI’s energy demand will make it more difficult—if not impossible—to dismiss the intermittency challenges associated with powering commercial and industrial loads with wind and solar energy. Data centers’ real-time power demand requires continuous, dispatchable power which cannot be provided solely by renewables without significant excess generation capacity and large amounts of cheap storage.

Technology companies like Microsoft and Google are **taking steps** to meet their data center energy needs. Microsoft recently inked an agreement with Constellation Energy to supply its data center with nuclear-produced power. Other firm clean energy sources may also play crucial roles in decarbonizing AI energy consumption. Last year, Google partnered with Fervo Energy to power its Nevada-based data center with geothermal power. At least one hydropower developer—Rye Development—is planning to develop hydroelectric facilities to match data center electricity use.

The bottom line is that we do not need to fear AI’s challenge to the energy grid. Utilities and tech companies will meet increased demand by using a **mix** of energy sources, including clean and firm electricity supplies like nuclear energy, geothermal power, and even hydropower. AI is not the first—and nor will it be the last—game changer in society’s energy consumption. The discourse on AI's energy footprint must therefore shift from apprehension to proactive problem-solving, focused on energy efficiency gains and diversification of clean energy sources, driven by the notion that a high-energy planet is essential for human progress.

**2. Tran is horrible.**

**A. It agrees solvency now and that nuclear energy isn’t key---a multitude of other technologies are gaining traction now.**

**B. It’s about quantum computers powering data centers, not the other way around, which kills their solvency because the link is about nuclear powering data centers, not quantum computing.**

<<FOR REFERENCE>>

Bao Tran, Patent Attorney, 3-18-2025, "Quantum Computing Energy Consumption: How Sustainable Is It? (Latest Data)," PatentPC, https://patentpc.com/blog/quantum-computing-energy-consumption-how-sustainable-is-it-latest-data, accessed 3-26-2025 //RR

**Quantum computing** is often seen as the future of computing, promising breakthroughs in everything from drug discovery to artificial intelligence. But there’s a big question that few people ask: how much energy does quantum computing use? And more importantly, how sustainable is it? What’s next for AVs? Get 2030 market predictions on growth, expansion & key industry trends. 1. Quantum computers **require cryogenic cooling, consuming up to 25 kW per dilution refrigerator**. **Superconducting quantum computers, the most common type today,**

**require extremely low temperatures—colder than outer space—to function. This is achieved using dilution refrigerators, which are complex machines that cool quantum processors to near absolute zero**. A single dilution refrigerator can consume up to 25 kW of power, which is a significant amount when considering energy efficiency. To put that into perspective, this is equivalent to running 25 high-powered air conditioners continuously. Actionable Insight: **For quantum computing to be sustainable, cooling technology must become more energy-efficient**. Researchers are working on new refrigeration techniques, such as cryogen-free cooling and alternative materials that require less extreme temperatures. Companies looking to use quantum computing should factor in the long-term energy costs of cooling. 2. A superconducting quantum processor operates at around 15 millikelvin, requiring substantial cooling energy. **The core of a superconducting quantum computer needs to be at about 15 millikelvin—a temperature so low that even the tiniest vibrations can generate heat and disrupt the system. Maintaining this extreme cold requires constant refrigeration**. This cooling process uses a cascade system, where several cooling stages progressively lower the temperature. Each of these steps demands energy, and inefficiencies at any stage result in higher power usage. Actionable Insight: More sustainable cooling methods could include new materials that remain superconducting at higher temperatures. Research into alternative qubit architectures, such as photonic or topological qubits, could eliminate the need for extreme cooling altogether. 3**. A single dilution refrigerator can consume as much power as 10 average U.S. households. The average U.S. household uses about 2-3 kW of power at any given time. That means one dilution refrigerator consumes as much power as 10 homes running continuously**. This raises concerns about the environmental impact of quantum computing. **If quantum computers scale up significantly, their energy consumption could become a serious challenge.** Actionable Insight: **Businesses investing in quantum technology should factor in energy costs**. Data centers using quantum computers must integrate renewable energy sources to minimize environmental impact. 4. Quantum processors themselves consume negligible power—on the order of milliwatts. Despite the high energy cost of cooling, quantum processors themselves consume almost no power. A single qubit operates on just milliwatts of energy, far less than traditional transistors in a classical computer. This suggests that if cooling efficiency improves, quantum computing could eventually be more energy-efficient than classical computing for complex problems. Actionable Insight: Optimization should focus on reducing supporting energy demands. Companies developing quantum computers should explore hybrid cooling solutions that minimize the power needed while maintaining qubit stability. 5. **Control electronics for quantum computers use kilowatts of energy per system**. While qubits require very little power, the electronics that control them do not. These include microwave signal generators, error correction processors, and readout systems. Together, they consume several kilowatts per quantum computing system. For large-scale quantum computers, this control infrastructure becomes a major bottleneck in energy efficiency. Actionable Insight: Is this article too long? Click Here To Download It For Free! Plus, get a checklist on how to execute the tips in this article, step by step Bao PatentPC Making Intellectual Property Easier Developing low-power control electronics is critical. Researchers are exploring cryogenic electronics that work at low temperatures, reducing the need for

high-powered classical controllers. 6. IBM’s 127-qubit Eagle processor requires around 10 kW just for control and readout electronics. IBM’s 127-qubit Eagle processor is one of the most advanced quantum chips, but its support infrastructure requires 10 kW of power—just for control and readout. This highlights a key issue: as quantum processors grow, the power required to manage them increases, potentially outweighing the efficiency gains of quantum computation. Actionable Insight: Efforts should focus on optimizing qubit connectivity and reducing error correction overhead. Smarter architectures that require fewer classical control components will lower energy demands. 7. Google’s Sycamore 53-qubit processor used around 26 kW for supporting infrastructure. When Google achieved “quantum supremacy” with its 53-qubit Sycamore processor, the total energy consumption—including cooling and control systems—was approximately 26 kW. This level of energy consumption is a concern because it suggests that even relatively small quantum computers consume as much power as multiple high-performance classical systems. Actionable Insight: Future quantum computing centers must integrate energy-efficient designs from the ground up. This includes better thermal management, optimized control electronics, and renewable energy integration. 8.**Quantum computers require thousands of classical processors for error correction, adding to power usage**. Quantum computers are incredibly error-prone, meaning they rely on thousands of classical processors to perform error correction. These classical processors significantly increase the total power demand of a quantum system. Error correction remains one of the biggest hurdles to scalable quantum computing. Actionable Insight: Research is moving toward more efficient error correction codes that require fewer classical resources. Advancements in quantum error correction could drastically reduce the energy footprint. Research is moving toward more efficient error correction codes that require fewer classical resources. Advancements in quantum error correction could drastically reduce the energy footprint. 9. Classical supercomputers used to simulate quantum circuits can consume several megawatts of power. Simulating a quantum computer using a classical system is extremely energy-intensive. Some supercomputers consume over 5 MW just to run quantum simulations. This highlights why quantum computers could be more energy-efficient for certain calculations—if their overhead energy costs can be reduced. Actionable Insight: Investment should prioritize applications where quantum computing is significantly more efficient than classical alternatives, reducing overall energy use. 10. The Frontier supercomputer, used for quantum simulations, consumes around 21 MW. Frontier, one of the world’s fastest supercomputers, consumes a staggering 21 MW of power. It is often used to model quantum systems. If quantum computers can achieve practical error correction, they could surpass supercomputers while using far less energy. Actionable Insight: The transition to practical quantum computing should prioritize replacing energy-hungry classical simulations with quantum alternatives where appropriate.

**3. NL - No war --- Kroenig changed his mind.**

**Kroenig 21**---Matthew; professor of government and foreign service at Georgetown University and the director of the Scowcroft Strategy Initiative at the Atlantic Council. Winter 2021; “**Will Emerging Technology Cause** **Nuclear War?**: Bringing Geopolitics Back In”; *Strategic Studies Quarterly*, Volume 15, Issue 4; Accessed Online via University of Michigan Libraries; //CYang

There are **several limitations**, however, to the existing analysis. First, the underlying theory of **nuclear conflict** this body of thought advances is debatable. It **rests heavily** on the “**use it or lose it**” cause of nuclear war, but use it or lose it is rooted in the **logical fallacy** of the **false dilemma**.12 **States have** **many options** in a crisis other than suffering a **disarming nuclear attack** or launching one. Moreover, faced with a range of choices, the **use-it or-lose-it logic assumes** a **state** will **intentionally choose to initiate** a nuclear **war**---the **most risky and costly available option**. The use-it-or-lose-it pathway to nuclear war, therefore, is in tension with mainstream nuclear deterrence theory that maintains states will be reluctant to conduct a deliberate attack on another nuclear-armed state.13

A second limitation of this approach is that **theories of nuclear instability** developed **in the** **early days of the Cold War** are **in tension with current understandings** of the causes of war in contemporary **i**nternational **r**elations theory. The nuclear stability framework rests on the notion that parity in the balance of power is associated with peace. The prevailing bargaining model of war, however, maintains that parity contributes to uncertainty about the balances of power and resolve, which hinders efforts to reach negotiated settlements short of armed conflict.14 The **empirical record** supports this theory and demonstrates parity in the balance of power is associated with conflict, and uneven balances of power are associated with peace.15 Situations of obvious strategic nuclear superiority, therefore, may be more stable than situations of strategic parity.

Perhaps the **most important limitation** of the **existing debate** is its tendency to theorize **in** the **abstract**, **divorced from real-world geopolitical conditions**. Proper nouns are rarely used. **States**, in these analyses, are **treated as black boxes endowed with** nuclear weapons and **new technology**, facing off against a **mirror-image** rival. The question of interest to scholars is whether the new technology could incentivize a generic nuclear-armed state to launch a nuclear first strike. The varying geopolitical positions, foreign policy ambitions, or ongoing political conflicts of interests among the major nuclear powers in the world today---the **U**nited **S**tates, China, and Russia---are not of **immediate interest**.

**4. T - Quantum-enabled attacks crash the economy.**

Ronald **de Wolf 17**, researcher at the Algorithms and Complexity group of Dutch Centre for Mathematics and Computer Science, 2017, “The potential impact of quantum computers on society,” *Ethics Inf Technol*, Vol. 19, pp. 271-276, <https://doi.org/10.1007/s10676-017-9439-z>, RMax

Roughly speaking, much of **cryptography** is based on **mathematical problems** that are easy to compute in **one direction**, but hard to compute in the **other direction**.2 A prime example of this (no pun intended) is multiplication: it is very easy to multiply together two large numbers p and q to obtain their product N =p × q; but going the other way, computing the factors p and q from N, is believed to be a hard computational problem for classical computers. How can we use easy-one-way/hard-the-other-way problems for cryptography? The basic idea of the RSA crypto-system is as follows. Suppose Alice wants to enable the rest of the world to send her encrypted messages, that only she can decrypt. She can choose two large prime numbers p and q (her secret key), and only make public their product N and an associated “encryption exponent” (this is her public key). Using the public key, anybody else can encrypt their messages to Alice in such a way that Alice can decrypt the messages using the extra information of her secret key. In contrast, classical eavesdroppers without this extra information can learn the encrypted message by tapping the communication channel, but cannot (as far as we know) decrypt the message in any reasonable amount of time.

The first big hit of quantum computers was Peter **Shor’s** 1994 efficient **quantum algorithm** for finding the prime factors of large numbers Shor (1997). A sufficiently large quantum computer would thus be able to compute the secret key from the public key of the RSA scheme, and hence can **decrypt** the **encrypted messages** sent to Alice. While some parts of classical cryptography are not affected by such attacks, much of our **online communication**, **e-commerce** etc., is protected by **cryptographic schemes** based on the hardness of factoring or similar problems that can also be efficiently solved by a quantum computer, such as “discrete logarithms.” **Shor’s discovery** was really the point when the area of quantum computing started to move from a fringe activity to a **central area of physics** and computer science, with lavish attention from funding agencies (interested in both basic science and technology) as well as spy agencies (interested in breaking enemy codes).

The **breaking down** of much of our **cryptography** would have a **large impact** on our **economy** and **society**, much of which **assumes** we can **safely communicate**, transfer money, sign documents electronically, etc. A world without reliable **electronic payments** and **bank transactions** would come to a **grinding halt**—clearly cash payments or barter are not good alternatives. **Governments** and many other organizations rely **crucially** on the ability to communicate **secretly**. Even if it will take decades to actually build a quantum computer big enough to factor large numbers, for things that have to remain secret for the next 20–30 years (a typical requirement for government secrets), the future **quantum threat** is **already** an acute problem **now**: enemy **spies** or the mafia can already **hoover up encrypted communication today**, store it, and **decrypt it later** when a quantum computer becomes available.

We mention two ways to **remedy** this, neither of them ideal. The first is so-called **post-quantum cryptography**. This is classical cryptography, based on **computational problems** that are easy to compute in one direction but hard to compute in the other direction **even by quantum computers**. Factoring does not fit this bill because of Shor’s quantum algorithm, but there have been proposals for using other computational problems, for instance based on lattices or on error-correcting codes. The problem with **such schemes** is that they have **barely** been **tested**. We are not able to prove that factoring is a **hard problem** for classical computers, but at least one good piece of evidence for such computational hardness is that many sharp mathematicians have tried for decades to find efficient factoring algorithms, and failed. The alternative **computational problems** that have been **suggested** for post-quantum cryptography, have **not** yet **undergone** such **scrutiny** and there may well exist an efficient quantum (or even classical!) algorithm for breaking them.

The **second** way to **remedy** the quantum attack on much of current-day cryptography is to use **quantum cryptography**, which uses **quantum effects** to design more secure cryptographic systems. The key property is the fact that measuring an unknown quantum state will disturb it, and such disturbance can be detected by the honest parties. The most famous example of such quantum cryptography is the BB84 “quantum key distribution” scheme of Bennett and Brassard (1984): using quantum communication, Alice and Bob (who trust each other but not the quantum channel over which they communicate) can either establish a shared secret key unknown to any eavesdropper, which they can then use for secure communication—or they can detect the presence of the eavesdropper. This scheme can be proved3 **secure**, even against **quantum adversaries** with unlimited amounts of time and computing power. Because the required hardware for such quantum cryptography is much **simpler** than for a **large quantum computer**, commercial implementations of these schemes already exist. These have repeatedly been **hacked** due to practical imperfections in their implementation, but they are getting better.4

**Decline causes great power war.**

**Brands 21** [Hal Brands, professor @ John Hopkins University and senior fellow @ the American Enterprise Institute, 5-14-2017, China Is a Declining Power—and That’s the Problem, Foreign Policy, https://foreignpolicy.com/2021/09/24/china-great-power-united-states/] tristan

Slowing growth makes it harder for leaders to **keep the public happy**. Economic underperformance **weakens the country against its rivals**. Fearing **upheaval**, leaders crack down on dissent. They maneuver **desperately** to keep geopolitical enemies at bay. **Expansion** seems like a solution—a way of grabbing economic **resources and markets**, making **nationalism** a crutch for a wounded regime, and beating back foreign threats. ¶ Many countries have followed this path. When the United States’ long post-Civil War economic surge ended, Washington violently suppressed strikes and unrest at home, built a powerful blue-water Navy, and engaged in a fit of belligerence and **imperial expansion** during the 1890s. After a fast-rising imperial Russia fell into a **deep slump** at the turn of the 20th century, the tsarist government cracked down hard while also enlarging its military, seeking colonial gains in East Asia and sending around 170,000 soldiers to occupy Manchuria. These moves backfired spectacularly: They antagonized Japan, which beat Russia in the first great-power war of the 20th century. ¶ A century later, Russia became aggressive under similar circumstances. Facing a severe, post-2008 economic slowdown, Russian President Vladimir Putin i**nvaded two neighboring countries**, sought to create a new Eurasian economic bloc, staked Moscow’s claim to a resource-rich Arctic, and steered Russia deeper into dictatorship. Even democratic France engaged in anxious aggrandizement after the end of its postwar economic expansion in the 1970s. It tried to rebuild its old sphere of influence in Africa, deploying 14,000 troops to its former colonies and **undertaking a dozen military interventions** over the next two decades. ¶ All of these cases were complicated, yet the pattern is clear. If a rapid rise gives countries the means to act boldly, the **fear** of decline serves up a powerful motive for rasher, more urgent expansion. The same thing often happens when fast-rising powers cause their own containment by a hostile coalition. In fact, some of history’s most gruesome wars have come when revisionist powers concluded their **path to glory was about to be blocked**.

### AT: SMRs

**1. NU - Microgrid investment is increasing.**

**John 23** [Jeff; Writer @ Canary Media; Month Date; Canary Media; “The US just made its biggest-ever investment in the grid,” https://www.canarymedia.com/articles/transmission/the-us-just-made-its-biggest-ever-investment-in-the-grid; DOA: 3-24-2025] tristan

The Biden administration is making a historic investment in the core infrastructure of the energy transition — the country’s power grid.

On Wednesday, the Department of Energy announced $3.5 billion in grants to expand capacity for wind and solar power, harden power lines against extreme weather, integrate batteries and electric vehicles, and build out microgrids that can keep the lights on during power outages.

The announcement named 58 projects across 44 states eligible to receive federal funding. When matched by funds from state and local governments and utility and industry partners, they will represent more than $8 billion in investment.

**SMRs too.**

**NN 25** [Nuclear Newswire; Subset of the American Nuclear Society; June 20; ANS; “DOE to invest $900M in next-generation nuclear,” https://www.ans.org/news/article-6140/doe-to-invest-900m-in-nextgeneration-nuclear/; DOA: 3-24-2025] tristan

The U.S. Department of Energy plans to invest up to $900 million to support the initial deployment of small modular reactor technology.

**2. NL - Lower profits deck long-term usage --- empirics.**

**Ramana 22** [M.V. Ramana, Professor @ University of British Columbia’s School of Public Policy and Global Affairs & Ph. D. in physics from Boston University, 8-3-2022, The Hollow Promise of Small Modular Nuclear Reactors, CounterPunch.org, https://www.counterpunch.org/2022/08/03/the-hollow-promise-of-small-modular-nuclear-reactors/, Willie T.]

The high cost of constructing and operating nuclear plants is a key driver of the decline of nuclear power around the world. In 1996, nuclear energy’s share of global commercial gross electricity generation peaked at 17.5 percent. By 2020, that had fallen to 10.1 percent, a 40 percent decline.

The high costs described above are for large nuclear power plants. SMRs, as the name suggests, produce relatively **small amounts of electricity** in comparison. Economically, this is a **disadvantage**. When the power output of the reactor decreases, it generates **less revenue** for the owning utility, but the cost of constructing the reactor is not proportionately smaller. SMRs will, therefore, cost more than large reactors for each unit (megawatt) of generation capacity. This makes electricity from small reactors **more expensive**. This is why most of the early small reactors built in the United States **shut down early**: they **just couldn’t compete economically.**

SMR proponents argue that the lost economies of scale will be compensated by savings through mass manufacture in factories and as these plants are built in large numbers costs will go down. But this claim is not very tenable. **Historically**, in the **U**nited **S**tates and **France**, the countries with the highest number of nuclear plants, **costs went up**, not down, with **experience**. Further, to achieve such savings, these reactors have to be manufactured by the hundreds, if not the thousands, even under very optimistic assumptions about rates of learning. Finally, even if SMRs were to become comparable in cost per unit capacity of large nuclear reactors, that would not be sufficient to make them economically competitive, because their electricity production cost would still be far higher than solar and wind energy.

**3. NL - Expansion is decked by manufacturing errors AND empirically, investment leads to failure.**

**Makhijani 21** [Arjun Makhijani, Ph.D. in engineering from UC Berkeley, 2021, Can small modular reactors help mitigate climate change?, Bulletin of the Atomic Scientists, https://www.laka.org/docu/boeken/pdf/6-01-2-16-67.pdf, Willie T.]

Potential problems with mass manufacturing reactors

If an error in a mass-manufactured reactor were to result in **safety problems**, then the whole lot of reactors may have to be **recalled**. This was the case with the Boeing 737 Max aircraft and the Boeing Dreamliner. But how does one recall a radioactive reactor? What would happen to an electricity system that relies on factory-made identical reactors that need to be recalled? What would happen to the order book for reactors if there were a recall? These questions have not been addressed by the industry; indeed, they have not even been posed. Yet recalls are a **predictable and consistent** feature of mass manufacturing, from smartphones to jet aircraft. The problem is **not merely theoretical**. One of the big economic problems of pressurized water reactors – the design commonly chosen for light water small modular reactors – was the need to replace the steam generators, often well before the end of license periods. Steam generators are massive, expensive pieces of equipment where the high-pressure water from the reactor is converted into steam, which drives the turbines to generate electricity. This problem has been recognized for decades; yet it persists.

Just within the last decade, three US reactors – two at San Onofre in Southern California and one at Crystal River in Florida – were **permanently shut** due to serious problems arising from steam generator replacement. A Nuclear Regulatory Commission report from 1996 documents ten spontaneous steam generator tube ruptures over the previous two decades (MacDonald et al. 1996). Likewise, Russian nuclear submarines have suffered leaks involving steam generators (Ølgaard 1996). Unlike present-day reactors, many small modular reactor light water designs are **integral designs**, wherein the steam generators are placed within the reactor vessel. In such a configuration, replacement would **be essentially impossible.** Problems with the steam generator could mean a **permanent reactor shut down**

Recent experience with modular nuclear construction has **not been a success**. Modular construction was a central aspect of the design of the AP1000 pressurized water reactor; yet the AP1000 reactors built in the United States have experienced **significant construction cost overruns** and **schedule delays**. One AP1000 reactor construction project in South Carolina became so expensive that it was abandoned after $9 billion had been spent, and Westinghouse, the company responsible for the reactor design, filed for **bankruptcy protection**. A former member of the Georgia Public Service Commission told the Wall Street Journal, “Modular construction **has not worked out** to be the solution that the utilities promised” (Smith 2015)

The small modular reactor track record

The small modular reactor track record so far points to the same kind of **dismal economic failure** as for their larger cousins.

The US Energy Department has been pursuing small modular reactors since the last century. In 2000, the US Congress provided funding “to undertake a study to determine the feasibility of and issues associated with the deployment of . . . small reactors” (Department of Energy 2001, 1; Congressional Record 2001). The Energy Department’s Office of Nuclear Energy 2001 report reviewed nearly ten designs and concluded that “the most technically mature small modular reactor (SMR) designs and concepts have the potential to be economical and could be made available for deployment before the end of the decade, provided that certain technical and licensing issues are addressed” (Department of Energy 2001, iii).

The US Nuclear Regulatory Commission has been similarly optimistic. In October 2008, it projected that the certification review for the NuScale design would be completed by 2015. It estimated that it would also complete reviews for other designs, including the Pebble Bed Modular Reactor and the Hyperion reactor (currently Gen4 Energy) in the same time frame (Baker 2008). None of that happened.

These rosy predictions failed to materialize **despite substantial government support**. In the early 2010s, the Energy Department supported two small modular reactor designs: mPower by Babcock & Wilcox and NuScale. The first of these was a complete failure; after years of trying to get investors and funding, the mPower program was terminated (Downey 2015; Adams 2017).

**4. NL - Natural shocks limit SMRs.**

**Fedchenko 24** [Vitaly Fedchenko, 1-26-2024, Small modular reactors may have climate benefits, but they can also be climate-vulnerable, SIPRI, https://www.sipri.org/commentary/blog/2024/holding-page-vitalys-blog-smrs-and-climate-vulnerability, Willie T.]

The other side of the coin: **SMRs and climate** risks

A century is a long time. At any given location, political and societal changes are inevitable, many impossible to predict. The case of the Zaporizhzhia Nuclear Power Plant in Ukraine is a case in point: When the decision to build it was taken in 1977, the idea that it would be caught up in a conflict between a post-Soviet Russia and an independent Ukraine was virtually inconceivable.

Climate change and its **direct and indirect** effects, including on politics and security, also pose risks for nuclear power plants and other critical infrastructure. Direct effects include rapid-onset **extreme weather** events (such as **storms** and storm surges, **heatwaves** and **flash floods**) as well as slower-onset phenomena (such as sea-level rise, **water scarcity**, changes to rainfall or average temperatures). All of this can undermine the safe and secure functioning of nuclear facilities. For instance, drought—especially compounded by competing demands for water—could disrupt the cooling water supply to a reactor, potentially necessitating a shutdown, while floods or storms could **damage critical systems.**

A 2021 analysis of nuclear power plants’ vulnerability to such climate-linked effects is full of important insights. The study shows that the average frequency of climate-linked power outages at nuclear power plants globally has **dramatically** increased—from 0.2 outages per reactor-year in the 1990s to about 0.82 in 2000s, to 1.5 in 2010–19. It projects that energy losses due to climate change will **continue to rise** among the world’s nuclear power plants.

**5. NU - Critical infra energy isn’t online --- can’t be hacked.**

**Flaherty 19** [Kate O'Flaherty, cybersecurity and privacy journalist @ Forbes, 7-3-2019, U.S. Government Makes Surprise Move To Secure Power Grid From Cyberattacks, Forbes, https://www.forbes.com/sites/kateoflahertyuk/2019/07/03/u-s-government-makes-surprise-move-to-secure-power-grid-from-cyber-attacks/, Willie T.]

The U.S. Government has announced a surprising move to secure power grids by using “**retro” technologies**. It comes after numerous attempts by foreign actors to launch cyberattacks on so-called **critical national infrastructure** (CNI).

Nations have been trying to secure the industrial control systems that power CNI for years. The challenge lies in the fact that these systems were not built with security in mind, because they were not originally meant to be connected to the internet.

It is with this in mind that the U.S. has responded with a **new strategy**: rather than bringing in new technology and skills, it will use **analog and manual** technology to isolate the grid's most important control systems. This, the government says, will limit the reach of a catastrophic outage.

 "This approach seeks to thwart even the most sophisticated cyber-adversaries who, if they are intent on accessing the grid, would have to actually **physically touch the equipment**, thereby making cyberattacks much more difficult," said a press release as the Securing Energy Infrastructure Act (SEIA), passed the Senate floor.

**6. T - SMRs invite cyberattacks.**

**Gray 23** [Cristina Siserman-Gray, Legal and regulatory specialist @ Pacific Northwest National Laboratory, 5-12-23, Cybersecurity for Small Modular Reactors (SMRs): Regulatory Challenges and Opportunities, Pacific Northwest National Laboratory, https://resources.inmm.org/sites/default/files/2023-07/finalpaper\_378\_0512115036.pdf, Willie T.]

Small Modular Reactors (SMRs) are a class of advanced nuclear fission reactors comprised of factory-built components and systems that are transported as modules and installed at a licensee's site. The term SMR reflects the size, capacity, and modularity of the construction of the reactor and is not indicative of the specific nuclear process used within the design. The International Atomic Energy Agency (IAEA) defines SMRs as reactors with electric generating capacity of 300 megawatts (MWe) and below. SMRs are considered to be the nuclear energy of the future. It is believed that this type of reactors could be key in helping countries achieve their net-zero goals, as they are estimated to be less expensive and safer to operate than traditional nuclear reactors which typically produce more than 500 MWe1. If successfully deployed, SMRs will provide clean energy integration with the grid, while working synergistically with renewable energy sources such as solar and wind2

Today, most existing nuclear power plants (NPP) around the world use a combination of digital and analog systems to monitor, operate, control and protect the facility3. Digital assets, systems, and networks associated with safety-related and security functions are typically air-gapped or protected from cyber threats originating from non-plant or external networks, including the Internet4, by implementing security controls such as datadiodes and firewalls. However, it is important to recognize that, while an air gap can introduce additional complexity into the attack path planning, it will **not stop all malicious attacks**, and facilities continue to be exposed to cybersecurity vulnerabilities.5 Incidents of cyber-attacks on computer systems, across **all industries**, are a common occurrence and are reported regularly in the media6 . In the past decades, several reports7 exposed the growing risk of a cyber-attack on civil nuclear facilities because of the increased reliance on digital systems and the growing use of “off-the-shelf” software and equipment, as well as vulnerabilities in the supply chain8.

Similar to traditional nuclear power plants, SMRs designs anticipate the use of semi-autonomous or **highly automated** control systems composed of **digital components** such as wireless monitoring, digital communications, remote or shared data processing and modern control-system components9 . With new SMRs designs anticipating a potential for remote use, portability of the systems, and critical digital process control, the existing design-basis threat analysis will have to be adapted to account for disruptive failures of automated technology and malicious threats, such as targeted cyberattacks. In this context, cyber-physical security risk management for SMRs is an active area of **research** and regulatory concern.

SMR concepts are currently at very different stages of development. While most of them only exist as concept studies, in several countries, SMR designs have already been certified by regulatory authorities on their safety design, and contracts for the construction of such plants have been signed (e.g., USA, Britain, Romania or Poland). Given that many governments are just beginning to grapple with the emerging cybersecurity risk specific to nuclear industry, regulatory standards are insufficient in addressing cybersecurity. In effect, only a small number of countries have issued regulatory requirements or other standards on cybersecurity at nuclear facilities, and even the few existing ones, do not contain specific cybersecurity references to SMR technology10. While this is understandable, given that the SMR technology is relatively new, it is however recommended that special attention is dedicated to this area as more regulators will have to go through the process of certifying SMRs as more designs are developed. This paper first identifies and analyses several cybersecurity vulnerabilities applicable to SMRs. Then, it highlights several cybersecurity national regulatory approaches and best practices that international organizations and several countries have proposed to address these challenges. Lastly, it identifies a series of recommendations on how these cybersecurity challenges could be potentially mitigated from a legal and regulatory perspective.

2. Cybersecurity risks and vulnerabilities for SMRs SMRs are expected to be very flexible as they can be scaled up or down to meet the energy demands and help power areas where larger plants are not needed. Yet, these nuclear technologies can be very different from the current operating nuclear fleet, as they are **relying on digitally controlled operations, miniaturization of components, wireless and automated technologies**, as well as artificial intelligence, all providing the promise of delivering innovative solutions for complying with nuclear security standards for SMRs11. At the same time, their use also presents several significant cybersecurity challenges, which will be discussed in the following section.

2.1 Remote Supervisory Control It appears that many companies developing SMRs intend to operate them in a mostly remote manner. This is likely driven by the potential for cost savings. Some potential use-cases for SMRs may include siting these reactors in "**off-grid" locations** such as isolated communities, remote mining camps, and distant industrial sites that require consistent and reliable power generation. Use of **SMRs in such environments would necessitate remote operation** and monitoring of the deployed reactors by licensed operators presumably **located a considerable distance** from the site. This poses a challenge as existing IAEA guidance effectively recommends that “command and control” of the reactor be conducted from a main control room located within the protected area of a site by a sizeable team of licensed operators12. Until now, the subject of remote operation of a commercial nuclear reactor was never envisioned or contemplated. As such, it represents a “paradigm shift” with respect to traditional nuclear plant operations13 .

Cyber security regulations associated with traditional NPPs characteristically require licensees to develop, apply, and maintain defense-in-depth protective strategies capable of detecting, responding to, and recovering from cyber-attacks. Central to these strategies is the implementation of a data flow model defining acceptable types of communications flowing between digital systems maintained at different security levels within the facility14. To facilitate such data transfer, it is recommended that licensees implement a robust Defensive Computing Security Architecture (DCSA) using devices and mechanisms to ensure that systems performing significant safety and security functions have the requisite level of protection15. Communications necessary to support command and control functions from an offsite location (e.g., a remote-control room) appear to be incompatible with SMRs data flow models.

Remote operation of SMRs also **creates an adversarial pathway** or vector of attack that was otherwise mitigated by onsite control rooms. Because control of the physical communications medium extends **far beyond the physical boundaries** of the site, it no longer inherits the benefits of the plant’s Physical Protection System (PPS). As such, certain disruptive attacks **cannot be effectively prevented** and may not be **responded to in a timely** manner. The severity of such an event is dependent upon the systems involved, the functions that they provide, and consequences resulting from loss or impairment of those functions.

### AT: Blue Water Deterrence

**1. NU - The US is far ahead and still going --- investment is inevitable.**

**Dibb 24** [Paul Dibb and Richard Brabin-Smith, both former deputy secretaries of defence. 4-26-2024, "Why the US will stay dominant in undersea warfare", Strategist, https://www.aspistrategist.org.au/why-the-us-will-stay-dominant-in-undersea-warfare/, doa 3-28-2025] //ALuo

A number of commentators in Australia have lately made rash pronouncements about the demise of US submarines, alleging that innovative technologies will make the vessels vulnerable. Others have been arguing that US nuclear-powered submarines are now noisier than their Chinese counterparts and will be easily detectable by China. ¶ The fact is that the United States has been **so far ahead** in **submarine technology** and **secure underwater operations** over the past 50-plus years that its submarines are virtually **undetectable** by either China or Russia. In the Cold War, US attack submarines (SSNs) tailed Soviet ballistic–missile firing submarines (SSBNs) at close quarters without being detected. There is every reason to believe that the same applies these days to China’s SSBNs. It is our view that China’s SSBNs are so easily tracked by US SSNs that China’s allegedly survivable second-strike nuclear capability is at high risk (as was that of the USSR in the Cold War). In brief, the quietness of US submarines and the sophistication of their operations are legendary. ¶ The reason for this is that for more than half a century the United States has **persistently** **poured vast amounts** of **research and development** into **superior underwater warfare technology**. Naturally, these capabilities are among the United States’ most highly guarded secrets, so little information about them is in the public domain. However, we recommend two books: Blind Man’s Bluff by Sherry Sontag and Christopher Drew (1998) and The Silent Deep: The Royal Navy Submarine Service since 1945 by Peter Hennessy and James Jinks (2016). The former is about highly classified US submarine operations involving the CIA tapping into the USSR’s seabed communications in the sea of Okhotsk for the Soviet Pacific submarine fleet in Kamchatka. US submarines made repeated visits and were not detected. The Silent Deep covers close–quarter submarine operations against Soviet SSBNs and SSNs by British nuclear submarines, whose reputation is similar to US submarines’. To our knowledge, there is no equivalent book available about operations against China’s submarines yet (but the subject is touched on by Michael McDevitt’s China as a Twenty First Century Naval Power, 2020). ¶ Those who talk about **superior Chinese submarine operations** being able **easily to detect US submarines** **do not know what they are talking about**. The fact is that until recently China has **depended very much** on **Russian technology** for its SSBNs and SSNs. That includes **even such relatively straightforward techniques** as isolating the noise of engines and other machinery from the hull. We need to remember that in the Cold War Soviet ballistic–missile firing submarines were known as **boomers** because their loud noises were **detectable over very considerable distances**. As for China dealing with US submarines, the Pentagon stated in 2023 that China ‘**continues to lack a robust deep-water anti-submarine warfare capability**.’ ¶ It is true, of course, that both Russia and China are making progress towards quieter submarine operations. But do we believe that the United States is sitting on its hands and making no technological advances? **Of course not**. The US Navy continues to **invest huge amounts** in ensuring that its submarines remain at the **absolute forefront** of hard-to-detect operations under the world’s oceans. ¶ So, when we take delivery of our three Virginia–class SSNs from the US, we can be confident that they will be both highly effective and difficult to counter. This is why China is so angry about the prospect of our acquiring them. China already has a bad case of SLOC anxiety (worrying about its sea lines of communication). It fears loss of critical supplies, such as oil, that come through the confined waters of Southeast Asia.

**2. NL - Staffing shortages aren’t resolved.**

**Walsh 24** [Steve Walsh, Military and Veterans Reporter, 4-17-2024, New Navy ships are years behind schedule, because manufacturers can't find workers to build them, https://americanhomefront.wunc.org/news/2024-04-17/new-navy-ships-years-behind-schedule-manufacturers-cant-find-workers-to-build-them, Willie T.]

Charles Spivey came to Newport News, Virginia from North Carolina 40 years ago to work in the shipbuilding industry. For the last six years, he’s been president of United Steelworkers Local 8888. Their roughly 12,000 shipbuilders work for Huntington Ingalls Industries, Inc. (HII).

"There's only one company in the world that can produce a nuclear powered aircraft carrier, and that's right here in the city where we do it," he said.

Navy Secretary Carlos Del Toro recently announced most of the Navy’s new ships are one to three years **behind schedule**, including the aircraft carrier USS Enterprise, the first Columbia-class submarines, and the next round of Virginia-class submarines produced in Newport News. Shipyards around the country have similar backlogs.

The Navy said one of its biggest problems is the **difficulty finding skilled tradespeople**. Roughly 1.4 million manufacturing jobs were lost during the COVID-19 pandemic. Some of those people **never came back**, Spivey said.

"COVID gave you an opportunity to explore, because some people were at home or laid off or took a break," he said. "They had to find work and they did find work. You probably lost some of your skilled people."

Shipbuilding is still a good living. People with experience earn more than $30 per hour, with quality healthcare and retirement benefits. But after the pandemic, other sectors of the economy became more competitive, at a time when many manufacturers are **clamoring for skilled workers.**

Spivey said newer workers often expect to **move up the ladder**. Fewer people want to spend a lifetime honing a skill, said Spivey, who noted that's a change from when he began to work in the shipbuilding industry.

"I remember my mentor," Spivey said. "He wanted to be the best truck driver he could be. He didn't need management. He didn't need anything."

The industry is now assuring prospective employees that they'll be able to move off the deck plates and into jobs in management, planning or engineering. Companies also are paying for college tuition.

"Our labor market has changed pretty dramatically post COVID," said Xavier Beale, Vice President of Human Resources and Trades at HII. "As we transition out of COVID, the **wage escalation** that we saw is a contributing factor towards our ability to retain talent, when the service industry increased their wages by more than 50%. The defense industrial base, and in particular shipbuilding, is now **competing in market spaces where we never have before."**

HII plans to hire 3,000 people a year, enough to keep its workforce at the level needed to fulfill its Navy contracts. Attrition is still an issue, but fewer people are leaving now than immediately after the pandemic, Beale said.

The company and the Navy are leaning heavily on training programs. It used to take five years to get a skilled tradesperson up to speed. Beale said the company is partnering with trade schools and has beefed up its in-house training to drive that time down to 18 months.

The labor shortage also has pushed the industry to get creative, bringing on older workers such as Mary Cupp, who has worked three years at HII in Newport News. She's a marine painter and has been working on the USS Massachusetts, the Navy’s next Virginia Class submarine. Before that, she worked in sales.

"My husband was retiring," Cupp said. "And because he's a little bit older than me, I needed to get some good benefits and still keep a good pay. So I chose the shipyard and they hired me at 59 (years old)."

Cupp had only painted around the house before she came to the shipyard. She says she loves the work.

"I do, I love it," she said. "I didn't know that I would, but I do. Once I get to my job, I can work at my own pace. Obviously, sometimes there is a little pressure to get something done quickly, but pretty much you decide how you want to work your area."

The industry also has been leaning on patriotism. The Navy is funding the private Blue Forge Alliance, which is sponsoring Major League Baseball this season. Its goal is to train more than 10,000 manufacturing workers per year over the next decade, as the baby boomers retire and the labor market tightens even further.

The Manufacturing Institute projects 2.1 million manufacturing jobs will go **unfilled by 2030**. That includes the skilled trades who maintain Navy ships, though unlike steel or auto manufacturing, shipbuilding **isn’t likely to be outsourced** to other countries.

"We're not only fighting against what we need, but we're also fighting against auto repair shops, wind energy, **anything that needs a skilled trade**," said Joe Frommelt of the Virginia Ship Repair Association. "We're fighting those demands that those industries are putting on that whole labor force."

**3. NL - No Taiwan invasion.**

**Roy 24** [Denny Roy, Senior Fellow @ the East-West Center in Honolulu specializing in Asia-Pacific strategic and security issues.  He holds a PhD in political science from the University of Chicago, 4-17-2024, Why China remains unlikely to invade Taiwan, Lowy Institute, https://www.lowyinstitute.org/the-interpreter/why-china-remains-unlikely-invade-taiwan, Willie T.]

Plenty of Americans — including senior military officers, academics, and politicians — think Chinese leader Xi Jinping sees war as the best option. Those making this argument typically say Xi is tired of waiting for unification to happen peacefully, sees a military window of opportunity, or has set a deadline for finishing the job. Some think China’s recent economic problems create an incentive for Beijing to launch a diversionary Taiwan war.

We cannot know Xi’s priorities with certainty. Nevertheless, from what we can observe, an elective war against Taiwan is hardly a compelling proposition for Xi’s government.

Even with China’s massive arsenal of modern warships, combat aircraft and missiles, Beijing is nowhere near the level of superiority that would guarantee a successful invasion given the probability of US and Japanese military resistance. Xi would need to worry about more than ferrying enough forces and their supplies across the Strait through the gauntlet of Taiwanese, US and Japanese ships, missiles, submarines, mines and drones. A cross-Strait war would disrupt regional economic activity, threatening the livelihoods of millions of Chinese. The resulting social turmoil could endanger Xi’s rule.

A Chinese blockade of Taiwan’s ports would be less risky, but would have disadvantages. Taiwan’s government may choose to resist. Beijing’s action would stimulate increased anti-China cooperation around the world; China could expect to suffer sanctions over a long period. And the United States would have ample time to surge forces into the region to assist Taiwan.

Beijing’s attempts to intimidate the US government into abandoning support for Taiwan have failed. Helping Taiwan to defend itself remains bipartisan US policy, even supported by Republican Party politicians who want to stop arming Ukraine. Despite the longstanding US policy of “strategic ambiguity”, President Joe Biden has publicly stated four times that US forces would intervene in Taiwan’s defence.

Xi doesn’t necessarily need to solve the Taiwan problem during his tenure to earn a legacy in Chinese history. Xi has three huge domestic projects. The first is restoring the primacy and authority of the Communist Party, which prior to Xi’s tenure as general secretary had suffered a decline in prestige due to rampant corruption, decentralised governance and the empowerment of civil society. The second is what Xi sees as ideological purification, including cleansing China of “Western” ideas and values. Third, Xi must oversee the transition of China’s economy from reliance on exports and investment in infrastructure to a new model that can maintain robust growth and advance China from a middle-income to a high-income country. Success in these projects would be enough to secure glory for Xi, who already enjoys a section in the Party’s constitution honouring “Xi Jinping Thought.”

A struggling economy does not make Beijing more likely to launch a war. China’s economic malaise appears to have dampened the Chinese public’s enthusiasm for a Taiwan campaign. The natural reaction to a lack of strength at home is to be more cautious in foreign affairs, not more aggressive. Thus, the appearance of serious issues in China’s economy in 2023 led to Xi trying to lower tensions with the United States, and a direct appeal to the business community to invest more in China during Xi’s visit to California last year.

Several US commentators and politicians raised alarm about Xi purportedly “warning” Biden during the California summit that China plans to forcibly seize Taiwan. A more accurate summary of Xi’s remarks would be that he restated the decades-old mantra that unification will happen. He gave no timeline, he said he hoped it would occur by peaceful means, and he denied that his government has a plan to attack Taiwan.

Like any People’s Republic paramount leader, Xi must repeat the promise of eventual unification, build up a military machine that deters independence, insist that the international community adheres to the “one China” principle, and maintain pressure on Taipei to enter negotiations with Beijing. There is no indication that Xi’s position in China is in jeopardy due to a perception he is not tough enough toward Taiwan.

Xi needs merely to avoid Taiwan declaring formal independence. If Taiwan did do so, Xi would probably opt for war. But even Taiwanese governments controlled by the Democratic Progressive Party, which rejects the idea of Taiwan being part of China, have shown that they will not cross this line.

Xi reached the pinnacle of the Party hierarchy through a career of careful positioning and quiet ruthlessness, not by taking grand gambles. Since then, he has shown a preference for grey-zone tactics. There is no convincing reason to expect him to rush to a military showdown over Taiwan.

**4. T - China will respond by creating an SSBN bastion in the South China Sea.**

Tong **Zhao 20**. Fellow in Carnegie’s Nuclear Policy Program based at the Carnegie–Tsinghua Center for Global Policy. “Modernizing Without Destabilizing: China’s Nuclear Posture in a New Era.” https://carnegieendowment.org/2020/08/25/modernizing-without-destabilizing-china-s-nuclear-posture-in-new-era-pub-82454#:~:text=Before%20China%20deployed%20strategic%20nuclear,United%20States%20may%20increase%20considerably.

First, the **U**nited **S**tates and China have **no mutual understanding** of how to incorporate China’s new sea-based nuclear capability into the bilateral strategic stability relationship. Through the 2010 Nuclear Posture Review Report and Ballistic Missile Defense Review Report, the Obama administration made commitments to maintaining strategic stability with China. In theory, this means the United States will not deliberately seek to undermine China’s nuclear retaliation capability. Many American and Chinese experts agree that maintaining a relationship of mutual vulnerability should be **tacitly accepted** as the starting point for discussing broader strategic security issues like missile defense and conventional hypersonic weapons. This mutual understanding, however, does not seem to have been **extend**ed to cover the **underwater domain**. The U.S. Navy, trained during the Cold War to keep enemy SSBNs in the crosshairs, views China’s emerging strategic nuclear submarine fleet as a **new threat** and has taken measures to develop a counter-capability. Together with allies in the region, the United States has deployed an increasing number of advanced anti-submarine maritime aircraft and nuclear attack submarines to military bases close to China. There are also new research and development programs that seek to use new technologies such as unmanned underwater vehicles to track and trail Chinese submarines.12 Such tracking and trailing of Chinese nuclear submarines would be necessary if the U.S. Navy wanted to be able to sink them when needed. There is no doubt that China sees such behavior as **highly threatening**. Technical and geographical factors further restrain China’s strategic nuclear submarine operations. Current Chinese SSBNs may not be sufficiently quiet to escape enemy detection in the deep sea. As a result, they may have to be deployed primarily in **coastal waters** in the near term, where the shallow water and noise created by busy shipping traffic can help conceal otherwise noisy submarines. To implement this deployment strategy, China may need to follow the Soviet example of creating a so-called **submarine bastion** in a certain area of its coastal water. This requires the deployment of substantial anti-submarine warfare (**ASW**) and general-purpose naval capabilities to sanitize a body of water and **make it safe for SSBNs** to conduct patrols. This type of operation would be **very resource-intensive**: during the Cold War, the Soviet Navy devoted a very large portion of its entire assets to protecting its SSBNs. But this is not the most challenging part of the mission. If the **U**nited **S**tates seeks to challenge China’s SSBNs, the risk of a conventional military confrontation would **rise considerably**. This is the most challenging part of China’s SSBN operations. Due to geographical constraints, China may have to deploy most of its **SSBNs** in the **S**outh **C**hina **S**ea and may need to create an **SSBN bastion** within part of that sea. Doing so would be particularly difficult in the South China Sea because of its busy international shipping traffic and the presence of multiple countries’ naval vessels that make frequent transit within the sea. The United States, with its long-standing commitment to freedom of navigation, is unlikely to stop challenging China’s efforts to keep foreign military vessels out of parts of the South China Sea. As China increases its nuclear submarine operations there, we have already seen several **dangerous encounters** between U.S. anti-submarine platforms and the Chinese military.13 Therefore, even though China’s deployment of strategic nuclear submarines is solely intended to strengthen its nuclear deterrent and has little conventional military utility, it could have significant implications for **military tensions** and **stability** at the conventional level. This problem will continue to exist and even grow if the two countries cannot reach a mutual understanding on the implications of China’s SSBN patrols and on how the United States should react to these Chinese operations.

**That guarantees war. The bastion will be perceived as a territorial grab.**

Tong **Zhao 18**. Fellow in Carnegie’s Nuclear Policy Program based at the Carnegie–Tsinghua Center for Global Policy. "Tides of Change: China’s Nuclear Ballistic Missile Submarines and Strategic Stability." https://carnegietsinghua.org/2018/10/24/tides-of-change-china-s-nuclear-ballistic-missile-submarines-and-strategic-stability-pub-77490.

BASTION STRATEGY AND SEA CONTROL For China, establishing an SSBN bastion in the fiercely contested waters of the **S**outh **C**hina **S**ea would require a requisite degree of **sea control**; apart from improvements to and growth in the country’s SSBN fleet, achieving this task will impose high demands on the PLA’s supporting capabilities. Moreover, the deployment and employment of such supporting capabilities could create additional **escalation risks**. The history of U.S. and Soviet naval encounters during the Cold War offers reason for **caution**. In the 1980s, after the Soviet Union withdrew its SSBNs to bastions in coastal areas, the U.S. Navy followed them in an effort to keep holding the submarines at risk. In response, Moscow took pains to strengthen the bastions and protect its SSBNs. Dangerous confrontations between Soviet and U.S. forces took place continually during this period.1 Because of China’s less favorable maritime environment, Beijing will face even greater **challenges** today establishing an **SSBN bastion** than Moscow did during the Cold War. The Soviet Union had the luxury of building SSBN bastions in relatively isolated coastal waters. The Kara Sea and the Sea of Okhotsk are far enough from any other countries that functionally they could almost be considered Soviet waters. By comparison, the **S**outh **C**hina **S**ea is anything but **isolated**. It contains the world’s **most important** trade routes, carries about one-third of **global shipping** volumes, and provides passage to about **half** of the world’s merchant ships.2 Moreover, the **S**outh **C**hina **S**ea is surrounded by **several countries**, many of which claim **sovereignty** over overlapping parts of it and exercise actual control over different land features. Clashes over fishing rights, oil resources, and sovereignty break out **frequently**. From a military perspective, the presence of naval vessels from multiple surrounding countries makes the **S**outh **C**hina **S**ea potentially **crowded**. States from outside the immediate region—particularly Japan, **So**uth **Ko**rea, and the **U**nited **S**tates—also have **important interests** there, including the protection of **trade routes**. These countries, therefore, operate their navies in the vicinity from time to time as well. So far, instead of pursuing a measure of sea control, Beijing has prioritized efforts to improve its **sea-denial capability**—that is, the ability to make some of its coastal waters unsafe for enemy ships to operate in. China has developed so-called **A2/AD weapons** for this purpose. For example, Beijing designed the DF-21D and DF-26 ballistic missiles to strike large surface ships and so deter such ships from operating close to the Chinese coast. Such capabilities can help prevent external powers from militarily infringing on China’s core national security interests, including in any future conflict over **Taiwan**. But establishing an SSBN bastion is much more demanding than simply making a body of water unsafe for an enemy’s ships; this task would require China to make a body of water safe only for its own submarines and ships. Foreign ASW-capable platforms—including surface ships, submarines, and aircraft—would need to be repelled from the area when necessary. China will not find it easy to obtain such sea control. The **U**nited **S**tates would be highly unlikely to willingly cede to China the power to control parts of the **S**outh **C**hina **S**ea. On the contrary, given the increasing tensions resulting from maritime territorial disputes in the region, Washington has started to dispatch regular flotillas to the South China Sea to conduct freedom of navigation operations (FONOPs) to assert what the United States sees as its rights. Upholding the principle of freedom of navigation is now a U.S. priority in the South China Sea. In June 2016 alone, for example, two U.S. carrier strike groups transited the South China Sea to conduct FONOP-related operations.3 An added motivation for the United States and other regional countries to prevent any single state from unilaterally controlling part of the sea and **denying access** to others is the July 2016 verdict of the Permanent Court of Arbitration in The Hague that challenged the legitimacy of China’s nine-dash-line-based territorial claims in the South China Sea. Since taking office, the Trump administration has continued to conduct FONOPs, following a short break, and senior U.S. officials have reaffirmed their determination to continue and further enhance such activities.4 In addition to its commitment to freedom of navigation, the United States is quickly enhancing its ASW capabilities in the region. Washington sees the gradual improvement of China’s submarine forces—including its **SSBNs**, SSNs, and advanced diesel-electric submarines—as a **major security threat**. Despite the technical inferiority of individual Chinese submarines compared to U.S. ones, the United States is concerned that China’s overall submarine fleet is apparently already larger than its own and that this gap may continue to grow.5 Notably, the United States already deploys 60 percent of its entire submarine fleet to the Pacific, and the U.S. military continues to deploy more maritime assets from other theaters to the Asia Pacific region.6 For instance, the former commander of U.S. Pacific Command, retired Admiral Harry Harris Jr., testified to Congress in 2016 that more SSNs are needed in the region to counter Chinese naval forces.7 Since the days of the Obama administration, Washington has increased the tempo of operations in the South China Sea involving advanced surface ships, many of which are equipped with cutting-edge ASW capabilities. With U.S. allies opening their military bases and airspace, the United States has deployed its most advanced anti-submarine aircraft around the South China Sea. To supplement older P3-C Orion aircraft, which have long operated in the region (including for ASW purposes), Washington has deployed much newer P8-A Poseidon aircraft to Okinawa, Japan; the Philippines; and Singapore. Malaysia has reportedly agreed to host such aircraft in the future.8 Additional states, including Australia, have purchased P8-A aircraft with the expectation that they can play a role in countering China’s growing submarine threat. Looking ahead, the competition is only getting **more intense**. IMPLICATIONS FOR **CRISIS STABILITY** Some overseas analysts have interpreted steps that the Chinese military appears to be taking to track other countries’ naval vessels operating in the **S**outh **C**hina **S**ea to have exacerbated **escalation risks**. Following the reported establishment of the Maritime Navigation Identification Zone in the South China Sea,9 the deputy chief of staff of the PLA Navy, Rear Admiral Wang Weiming, claimed in 2017 that the Chinese military “will track every military vessel and will intercept every aircraft within the scope of their responsibilities.”10 This declaration has raised concerns in other countries that, if implemented, such a policy could increase the **risks** of a peacetime incident leading to a conventional military **conflict**.11 Any steps China takes to purge from some part of the South China Sea all non-Chinese ASW platforms would encounter **significant challenges**. In particular, serious military confrontations could **break out**, as earlier Chinese efforts to interfere with foreign ASW-related operations in the South China Sea demonstrate. In the past few years, China has frequently scrambled fighter jets to intercept U.S. maritime aircraft, such as P8-As, over areas not far from the Hainan submarine base. In some of these cases, Chinese pilots have made aerobatic maneuvers very close to U.S. aircraft to stop them from conducting surveillance, which Beijing believes was sometimes directed against SSBNs hiding underwater. Some of these interceptions were so dangerous that the United States repeatedly protested them, further straining the U.S.-China military relationship.12 As China starts to deploy its SSBNs from Hainan, dangerous encounters may become **more frequent**. In a future hypothetical crisis, if China follows the U.S. doctrine of attempting to preemptively destroy enemy airfields to prevent anti-submarine aircraft from taking off in the first place, even more serious risks of **rapid escalation** could result.13 Aside from its surveillance aircraft, the United States sometimes dispatches surface ships to the South China Sea to map the seafloor and collect hydrographic measurements. These activities, especially if conducted near Chinese SSBN bases, can spark incidents. In May 2009, for example, Chinese maritime militia ships harassed the U.S. Navy’s Impeccable by trying to prevent it from conducting surveillance and attempting to snag its acoustic equipment in the water. In response, the Impeccable’s crew shot their water cannon at the Chinese vessels.14 Potential escalation risks could **extend to land** as well. In the future, China may follow the Russian practice of deploying more and higher-quality land-based anti-ship **cruise missiles**, as well as its unique **anti-ship ballistic missiles**, along the coast to protect Chinese SSBNs by repelling enemy ASW-capable surface ships.15 According to the U.S. Joint Concept for Access and Maneuver in the Global Commons (JAM-GC), a U.S. military concept that succeeded Air-Sea Battle, Chinese anti-ship missiles are a key component of China’s A2/AD capability and might be preemptively attacked in a regional conflict to protect all large U.S. surface combatants. Yet, regardless of U.S. intent, China might interpret the loss of its anti-ship missiles at the beginning of a **hypothetical conventional conflict** as linked to a U.S. effort to undermine the **survivability** of its SSBNs. Furthermore, the underwater measures China might take to reduce the threat posed by enemy SSNs could be seen by others as provocative and potentially increase the risk of incidents. In February 2017, the Legislative Affairs Office of the State Council started to seek public comments on a revised draft of the Maritime Traffic Safety Law of the People’s Republic of China. This revised draft stipulates that, when in Chinese territorial waters, foreign submarines need to stay surfaced, show their national flag, and report to China’s maritime administrative agencies.16 There is concern that this new law, if passed, might have implications for foreign submarine activity in major parts of the South China Sea—especially given that China has not clarified over which parts of the South China Sea it claims sovereign rights.17 A further concern is that Chinese efforts to enforce any new rules by, for example, attempting to repel foreign ASW platforms, could **precipitate confrontations**.