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#### US is losing nuclear race.

**Price '25** [Rowen Price; Senior Policy Advisor for Nuclear Energy; Christel Hiltibran; Director of International Policy, Climate and Energy Program; Ryan Norman; Senior Policy Advisor for Climate and Energy Finance; Alan Ahn; Deputy Director for Nuclear; 01-31-2025; "Trump Has Been a China Hawk on Nuclear Energy. But Congress Could Compromise That During Reconciliation."; Third Way; https://www.thirdway.org/memo/trump-has-been-a-china-hawk-on-nuclear-energy-but-congress-could-compromise-that-during-reconciliation; accessed 03-15-2025] leon + AZ

**China is churning out large reactors at home, demonstrating** (i.e., building and operating) **advanced reactor technologies, and marketing advanced reactors cheaply** along its “Belt and Road.” **To stay relevant in this race** for international market share, **the US must rapidly finance the demonstration and subsequent commercialization of US nuclear small modular reactors** (SMRs) **and advanced nuclear reactors**. **The time is now, in the 2025 reconciliation process, to save this critical sector from opening its global market to China**. Why? **The decisions the US government makes this year will dictate whether US nuclear developers have the resources they need to keep pace and ground test these technologies**. In the interest of national security and to ensure US competitiveness, **Congress must robustly appropriate funding for advanced nuclear demonstrations and maintain federal programs critical to the scale-up of these technologies**. The following programs are all essential to preserve or expand during budget reconciliation.

#### Affirming revitalizes US leadership.

**Hiltibran ’25** [Christel Hiltibran; Director of International Policy @ Third Way, MS in Environmental Science from Johns Hopkins University, BA in Political Science from Loyola University Maryland; 01-31-2025; “Trump Has Been a China Hawk on Nuclear Energy. But Congress Could Compromise That During Reconciliation”; Third Way; https://www.thirdway.org/memo/trump-has-been-a-china-hawk-on-nuclear-energy-but-congress-could-compromise-that-during-reconciliation; accessed 3-7-2025] tristan + leon

Beyond bilateral trade barriers, the US must also dominate critical global industries to remain competitive. There is broad consensus that investments in national defense, space, artificial intelligence, and quantum computing will help make America more secure and more prosperous. **The same is true of investments in nuclear energy**. A robust domestic nuclear supply chain has corollary benefits, including reliable energy supply, that are foundational to our defense and technology sectors. Moreover, **the strength of our nuclear industry directly supports our competitiveness abroad, which in turn affects our ability to uphold the highest global norms in nuclear security and nonproliferation**. **Failure to compete overseas will enable China, Russia, and other rivals to erode our influence on these international standards** and cement century-long geostrategic partnerships around the world. Putting the US at the forefront of global civil nuclear markets will make us stronger, more secure, and more influential on the global stage.

**Our adversaries understand the stakes**. China and Russia have state-owned, heavily subsidized nuclear industries that are a key part of their efforts to gain allies and influence throughout the developing world. China and Russia view nuclear exports as a way to develop century long partnerships in Africa, Asia, and Eastern Europe. **Their interest in advanced nuclear power is less about economics, and more about influence**. The competition is well underway and **the United States is losing**. According to the International Atomic Energy Agency, **85% of all new reactors currently under construction in 2024 are Russian or PRC designs**; 0% are US designs.

This year, President Trump and the new Republican Congress have an opportunity to do just that—through budget reconciliation.

Trump Could Cede Critical Geopolitical “Energy Dominance” to China in His First 100 Days by Compromising America’s Nuclear Industry—But It’s Not Too Late

**Put simply, if we want to outcompete China, Congress needs to continue to prioritize clean energy**.

The incoming Trump administration has made no secret of its hostility to the Inflation Reduction Act (IRA) and its clean energy provisions, especially its investments in wind and solar. But despite recent bipartisan alignment in support of nuclear energy, Trump’s agenda not only targets renewables but may also incidentally deal a significant blow to programs supporting nuclear development and demonstration in the US.

During the 117th Congress, **IRA and the Bipartisan Infrastructure Law (BIL) created tax credits, grants, and loan programs to finance the research, development, demonstration, and even the deployment of emerging clean energy technologies, including nuclear**. In a flurry of signals issued during the lame-duck period, the incoming administration and Republican Congressional leadership have made clear that many of these programs are on the chopping block in the first 100 days of the second Trump administration. **In competition with state-backed civil nuclear programs such as China, the US needs to bolster its federal government funding for nuclear**, not decrease it.

China is churning out large reactors at home, demonstrating (i.e., building and operating) advanced reactor technologies, and marketing advanced reactors cheaply along its “Belt and Road.” To stay relevant in this race for international market share, the US must rapidly finance the demonstration and subsequent commercialization of US nuclear small modular reactors (SMRs) and advanced nuclear reactors. The time is now, in the 2025 reconciliation process, to save this critical sector from opening its global market to China. Why? The decisions the US government makes this year will dictate whether US nuclear developers have the resources they need to keep pace and ground test these technologies. In the interest of national security and to ensure US competitiveness, Congress must robustly appropriate funding for advanced nuclear demonstrations and maintain federal programs critical to the scale-up of these technologies. The following programs are all essential to preserve or expand during budget reconciliation.

Programs we can’t afford to lose

Existing resources and upcoming reauthorizations can still go a long way toward making US nuclear deployments a reality. **Congress must provide robust funding for these programs in FY25 to maintain the US’ competitive advantage**.

Federal Program Mechanism Funding Available

Advanced Reactor Demonstration Funding Appropriations for the Advanced Reactor Demonstration Program BIL provided $2.5B; additional funding via annual appropriations is needed to complete the projects.

Loan Programs Office (LPO) Title 17 Programs Established under IRA: 1706: supports energy projects repurposing non-operational infrastructure and upgrading systems 1703: provides loan guarantees for innovative technologies. 1706: Up to $250B in loan guarantees, $5B credit subsidy appropriations. 1703: $40B in loan authority, most of $3.6B appropriations

Inflation Reduction Act 45Y and 48E Tax Credits Established under IRA: The production (45Y) and investment (48E) tax credits for clean electricity are tech neutral---thereby providing immense value for new nuclear projects. 45Y: 1.5 cents per kWh (adjusted for inflation) for facilities which meet prevailing wage and apprenticeship standards. 48E: Valued at 30% for projects which can demonstrate that they meet prevailing wage and apprenticeship standards.

Advanced Reactor Demonstration Funding

What it is: Appropriations for DOE’s Advanced Reactor Demonstration Program. This first-of-its-kind program provides multi-billion-dollar public-private partnerships for some of the US’s leading advanced nuclear power plants.

Why it’s essential: **Very few foreign customers will buy American nuclear technology until that technology has been demonstrated at home**. BIL provided $2.5B initial award funding for these programs. Since then, the two cost-share grants supported by this program have relied on annual appropriations. As of 2025, neither award has been fully funded yet. The successful and on-time completion of these projects requires robust annual appropriations. As such, the FY2025 Energy and Water Appropriations bills that have passed through the relevant committees contain significant funding for nuclear demonstrations. The Senate bill, drafted by Democratic Appropriations Chair Patty Murray (D-WA), makes up to $800M for nuclear demonstrations, and the House bill, drafted by GOP Chair Chuck Fleischmann (R-TN) contains $9B for nuclear demonstrations (although much of this funding comes from effectively eliminating loan programs that are important for nuclear energy). President Trump and Congress must ensure that the US fully funds both leading US advanced nuclear demonstrations and delivers on the bipartisan investments that lawmakers have made in the program.

Loan Programs Office (LPO) Title 17 Programs

What it is: Title 17 can finance a variety of projects across the nuclear industry, including nuclear reactor supply chain and manufacturing, new SMR and microreactor deployment, new large Gen III+ reactor deployment, and even nuclear fuel cycle projects.

Why it’s essential: Through the Energy Infrastructure Reinvestment Program (known as Section 1706) and Innovative Clean Energy Program (known as Section 1703), LPO can finance almost every type of new nuclear project from innovative greenfield plant builds to energy infrastructure retrofits, such as Holtec’s Palisades Plant restart. Indeed, the most recent new nuclear project in the United States, Units 3 and 4 at Plant Vogtle, were financed with over $12 billion in loan guarantees, awarded in both the Obama and Trump Administrations.

In September of 2024, LPO identified $65B in existing or incoming advanced nuclear project applications to be funded through the program's existing loan authority. This includes a suite of innovative projects, such as the restart of Constellation’s Three Mile Island, which could be one of the first nuclear projects brought online to serve America’s AI boom. Many other advanced nuclear developers, utilities, and data center developers are counting on LPO funding to finance the construction of nuclear projects in the next few years.  In addition to funding, Congress must commit to growing the US nuclear industry by extending LPO’s Title 17 authority lending authority, which is set to expire on September 31st, 2026.

Inflation Reduction Act 45Y and 48E Credits

What it is: Established under the IRA, the production (45Y) and investment (48E) **tax credits for clean electricity are tech-neutral–thereby providing immense value for new nuclear projects**.

Why it’s essential: **These credits provide much needed value for new nuclear projects across the US**, making them more attractive to private investors and **even providing a financial hedge against inflated first-of-a-kind project costs**. The 45Y production credit is 1.5 cents per kWh (adjusted for inflation) for facilities which meet prevailing wage and apprenticeship standards; the 48E investment credit is valued at 30% for projects which can demonstrate that they meet prevailing wage and apprenticeship standards.

#### Countries prefer US reactors.

**Gattie ’19** [David Gattie; Associate Professor of Engineering at the University of Georgia’s College of Engineering, Senior Fellow @ UGA’s Center for International Trade and Security; 05-22-2019; “Will the US lead? Or let China and Russia dominate nuclear energy”; The Hill; https://thehill.com/opinion/energy-environment/444944-will-the-us-lead-or-let-china-and-russia-dominate-nuclear-energy/; accessed 03-07-2025] tristan + leon

Moreover, **with the UK, South Korea, Japan and France having shown signs of political uncertainty in their respective commitments to nuclear power, the global nuclear ecosystem is potentially vulnerable to domination by a country pursuing a role of top predator**.

**Meanwhile, the world is seeking U.S., Allied leadership in nuclear power** — a clarion call that must be heard. At a minimum, **there must be a viable non-authoritarian nuclear partner alternative committed to the rule of law, individual liberty, cooperative security, multilateral alliances and fair trade**. However, while other countries waver, two countries show no signs of retreating from an aggressive nuclear power future — China and Russia. In fact, they are doubling down.

#### Agreements aren’t locked in yet.

**Szulecki ’23** [Kacper Szulecki; Research Professor in International Climate Governance @ NUPI, Professor @ the University of Oslo, Fellow @ the Centre for Socially Inclusive Energy Transitions; 02-27-2023; “Russian nuclear energy diplomacy and its implications for energy security in the context of the war in Ukraine”; Nature; https://www.nature.com/articles/s41560-023-01228-5; accessed 03-07-2025] tristan

While this is impressive, looking into the details of these agreements (particularly the NPP construction projects) reveals a more modest level of international engagement. **Many of the projects have been stuck at the planning stage for several years or are merely visions laid out in non-committal MoUs**. **Competing offers might ultimately be chosen over those from Rosatom**. For instance, the expansion of the Dukovany NPP in Czechia saw calls from opposition parties and the Czech secret service to exclude both Chinese and Russian companies from the tender, citing security concerns37, and Rosatom was explicitly excluded in 2021 following news of Russian intelligence involvement in a 2014 explosion at a Czech ammunition depot38. This happened despite Czechia’s relatively positive attitude towards Rosatom39 and the faith of the policymakers in nuclear energy as a foundation for energy security40,41. **The Russian invasion of Ukraine triggered further cancellation of planned Russian-built nuclear power plants in Finland, Jordan and Slovakia**.

#### Leadership determines hegemony.

**Rodriguez '22** [Eric Rodriguez; Master's student in public administration; August 2022; "The Eastern Atomic Rise: Defining Nuclear Hegemony in a Multilateral World"; SIT Digital Collections; https://digitalcollections.sit.edu/cgi/viewcontent.cgi?article=4303&context=capstones; accessed 03-31-2025] colon + leon

This review of the existing literature has established that the academic framework to evaluate and study the utility of nuclear energy as a diplomatic and hegemonic tool does not exist. The geopolitical landscape continues to shift, most notably with the emergence of the BRICS (Brazil, Russia, India, China, South Africa) organization, which is challenging western hegemony. **The hegemonic dynamic of nuclear power is also evolving as Russia** (Geller, 2022) **and China emerge as global leaders in nuclear energy development and exports**. (Wang & Lee, 2022) **To maintain global stability and security, compatible academic and policy tools must also be developed**

Existing narratives born out of Cold War realism continue to frame the discourse in a profoundly different world order. Bin, for example, notes the alarmist view of nuclear weapons confrontation that frames much of the current discourse on U.S.-China nuclear relations. Ritchie notes a global nuclear “ordering anxiety” arising from the intersectionality of the mixed success of arms control initiatives and perceived renewed nuclear threats driven by the eroding “liberal international order”.

As long as realist Cold War and alarmist narratives continue to define the discourse on nuclear technology, leaders and academics, particularly in the west, will continue to look in the wrong direction by focusing on weapons when they should also be paying attention to Russia and China’s gains in nuclear energy. This has profound implications for foreign policy and the shaping of the emerging world order.

RESEARCH DESIGN AND METHODOLOGY

The over-arching phenomenon to be studied is the nuclear dimension of energy geopolitics. **The hegemonic nature of nuclear power has changed over time with the simultaneous diminishing of Western dominance and the growing influence of the Global South**. Therefore, Grounded Theory, which, according to Merriiam & Tisdell (2015), addresses “questions about process; that is, how something changes over time”, is the appropriate analytical framework for the study.

As **Russia and China exercise hegemony through cooperation within the BRICS organization and in greater South-South relations**, Cox’s Political-Economic Hegemony Theory is the most appropriate theoretical foundation upon which to base research for this paper. **Since Russia and China’s emergence as nuclear energy hegemons within a governance context are relatively unstudied and overlooked**, Critical Theory, which Bronner (2011) argues, “must respond to the new problems and the new possibilities for liberation that arise from changing historical circumstance”, is the appropriate framework under which to conduct research. At the same time, **Grounded Theory**, which Saldaña (2011) describes as “an analytic process of constantly comparing small data units” (in this case, case studies of Russian, Chinese, and American nuclear energy strategies), **is the logical foundation for comparative analysis and is a practical approach to employ in building a definition of Nuclear Hegemony**.

The primary methodology employed in this study consists of collecting and analyzing case studies under the Canonical Genre of qualitative research. (Marshall et al., 2021) Most contemporary literature about the philosophical and theoretical concepts of hegemony is oriented around Gramsci’s writings on power dynamics characterized by the transactions of socio-political groups as models to counter fascism, which modern scholars such as Hayes and Cox adapted and framed within geopolitical discourse. Considering that Gramsci was interested in alternate systems of governance (which is particularly relevant with the emergence of BRICS and other “counter-hegemonic” actors), his work and those of his modern counterparts are a logical foundation upon which to develop an appropriate concept of hegemony for the first phase of research for this paper.

The second phase consisted of case studies of Russian, Chinese, and American foreign policy and nuclear programs, encompassing analyses of government publications (where available) from all three states, as well as research and commentaries by western, Asian, and Eurasian academic institutions, think tanks, and media, who identified both the mechanisms by which these actors penetrated foreign nuclear markets, how their presence and capacity can and do affect how their client states behave, and to project how they may exercise their political, economic, and scientific advantages on the geopolitical stage.

During the third and final phase, the definition of Nuclear Hegemony is developed using Critical Genre approaches (Marshall et al.,) such as Critical Ethnography and Critical Discourse, based on Hayes’ Political-Economic Hegemony Theory. The hegemonic tools identified in the case studies were incorporated into traditional perceptions of hegemony and framed within international relations theories of Realism, Liberalism, and Constructivism.

DISCUSSION

Hegemony Conceived

We will proceed with a working conceptual idea of hegemony based on Hegemonic Stability Theory (Gilpin, Keohane), which attempts to explain how **more endowed states leverage their political and economic advantage to influence the behavior of less endowed states**. In simple terms, according to Joseph (2003), hegemony concerns the relationship between a dominant group’s leadership and a subordinate group’s consent.

Cox’s analysis of hegemony traces its modern origins to the work of Antonino Gramsci, former leader of the Italian Communist Party. While imprisoned in Italy, Gramsci wrote a series of papers that focused on defeating fascism and envisioned alternative models of the social fiber of the state based on Marxist concepts of an emergent working class that could exercise power in the state.

Contemporary scholars have struggled to define hegemony concretely. Ougaard (1988), for example, attempts to define hegemony first within the context of resource distribution in which hegemony represents “a preponderance of material power resources”, and second within the context of a state pursuing its own interests within an environment of conflict. Clingan (2013) attempts to define hegemony through economic indicators, suggesting, for example, that a state has achieved hegemony when its economy is larger than the next three combined. However, he notes that a definitive determination is a challenge because conventional measures such as GDP, GDP per capita, and output per worked hour, to name a few, yield different results. He also cites geography and distance as a limit on hegemony, noting that the ability to exert power diminishes proportionately with distance from power centers and resources.

Other scholars, such as Cox, focus on conditions conducive to achieving hegemonic capacity. He suggests that **a prerequisite feature of a hegemon is the foundation and protection of a world order that originated with a social or economic revolution in the hegemonic state that then spilled over to other states**. Consistent with Wallerstein’s Worldsystems theory, in which socially, politically, and economically advanced “core” states exert influence on less developed “semi-peripheral” and “peripheral” states, (Agnew, 2020) we can witness this phenomenon during the mid-nineteenth century British hegemonic expansion, the United States’ global position post World War II, and more recently during we are seeing the economic and political influence of the BRICS organization spreading to other states in the Global South. (Teslova, 2022)

Beyond these sources, there are few identifiable definitive factors that can be used to evaluate a state’s hegemonic status. Scholars of nuclear governance should not be discouraged by this but should instead see this as an opportunity to break new ground in this re-emerging field of study. Central to defining **Nuclear Hegemony is the acknowledgment of the hegemon’s capacity to make the rules by which other players abide through “the elaboration of political projects, the articulation of interests, the construction of social alliances, the development of historical blocs**, the deployment of state strategies and the initiating of passive revolutions.” (Joseph)

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International Relations Theory: Realism, Liberalism, and Constructivism¶ The three key international relations theories of Realism, Liberalism, and Constructivism seek to explain why and how sovereign states, who control all social, economic, and political activity within their borders, pursue their own interests and selfpreservation absent accountability to a prevailing institution (Mearsheimer, 1994) in a “competitive, often ruthless, Hobbesian domain” known as anarchy. (Gilpin, 2012; Glaser, 2019) Thomson (1995) defines sovereignty as the” recognition by internal and external actors that the state has the exclusive authority to intervene coercively in activities within its territory”.¶ Norwich University (n.d.) characterizes Realism as an environment in which a state acts to maximize its social, economic, and political power and influence in the interest of self-preservation. According to Donnelly (2014), “Realism emphasizes the constraints on politics imposed by human nature and the absence of international government. Together, they make international relations largely a realm of power and interests.”¶ Because states will almost always act in their own self-interest, (Gilpin, 2007) the state’s behavior is manifest through power. (Morgenthau & Thompson, 2018) Any action, including military action, is therefore justified in the interest of self-preservation(Schwarzenberger, 1964) as articulated by Schurmann’s Political-Military Hegemony theory, which is based on “direct political and military rule by one state over many aspects of the internal and important aspects of the external policies of other states” and is inherently coercive.¶ As one state acquires power, it diminishes other states’ relative power and influence. From a realist geopolitical perspective, hegemony can therefore be conceived as a global power system in which a state can exercise its economic and military dominance to “regularly get its way.” (Clingan) The subsequent system of winners and losers creates a perpetual state of competition for power and influence (Waltz, 2010), which inevitably leads to conflict.¶ Liberalism is defined by “an emphasis on international cooperation as a means of furthering each nation’s respective interests.” (Norwich University) The common market function of the European Union is an excellent articulation of liberal thought in which a capitalist, liberalized, integrated open market functions as the optimal mechanism to produce goods and services and ensure happiness and prosperity (Fukuyama, 1989) for its member states. It also creates a system of interdependence, in which states’ collective wellbeing depends on their ability to cooperate. (Paul, 2012) Interdependency, in theory, minimizes the likelihood of armed conflict, but it also requires states to relinquish their sovereignty, in certain policy areas, to a supranational authority. Liberal theory, therefore, aligns with Cox, Fenton’s (2018), and Mollakkattu’s (2009) concept of hegemonic power as based on the compatibility of interests between the hegemon and consenting states who willingly accept and (sometimes) actively participate in the supranational authority of the hegemon.¶ Constructivism “rests on the notion that rather than the outright pursuit of material interests, it is a nation’s belief systems—historical, cultural and social —that explain its foreign policy efforts and behavior”. (Norwich University) States are not the most important actors in international relations because international institutions and other non-state actors are valuable in influencing behavior through lobbying and acts of persuasion. (Norwich University) It could be argued that the emergence of the BRICS organization to challenge western hegemony and reshape western-dominated global institutions represents a nascent constructivist hegemonic order.¶ While a firm understanding of these IR theories is crucial to building a definition of Nuclear Hegemony, it is critically important to recognize that hegemony within a nuclear context is evolving and therefore contains elements of some or all three theories, which are often contradictory. Saull (2017), for example, balances liberal and realist approaches, describing hegemony as “international leadership by one political subject, be it the state or a “historical bloc” of particular social groupings(…)of other, weaker, less powerful parties.”¶ Alternately, while Hayes notes that nuclear geopolitics are “nuclear bloc” politics versus “balance-of-power” politics, suggesting that he views nuclear politics through a liberal lens versus a strict realist approach, Cox notes the applicability of Gramsci’s concept of hegemony to global governance because of the interplay of power groups and “alternate states” which is particularly relevant with the emergence of BRICS and other constructivist organizations.¶ Before we add the layer of nuclear technology to our analysis, two final points need to be made about hegemony and international relations: 1. While Realism and liberalism appear to be the dominant IR theories that arise when analyzing hegemony, it is important to remember that while these conventional concepts have shaped academic thought on the subject, we are venturing into a new political arena with newly emergent players and new concepts of world orders that are challenging these concepts. Therefore, we must be vigilantly mindful of the role that Constructivism and constructivist institutions can play in shaping contemporary concepts of hegemony; 2. That notwithstanding, it is equally important to be mindful that despite the cooperative and consensual verbiage of nuclear agreements, Cox warns us that when analyzing hegemony, coercion is always implied.¶ Perspectives on Nuclear Energy¶ Nuclear technology remains controversial in many parts of the world, particularly in the west. Many western countries have voiced strong opposition to nuclear energy, ranging from safety and security concerns to costs. Critics of nuclear energy, for example, warn of the potentially disastrous effects of reactor failure. The Union of Concerned Scientists (2013) list seven accidents associated with nuclear energy, including the melting of the Windscale 1 core in Cumbria, UK, in 1957 and the accidents at Three Mile Island in the United States, Chornobyl, Ukraine (former Soviet Union) in 1986, and most recently the Fukushima Daiichi reactor in Japan in 2011. The human casualties and environmental, structural, and capital damage that render affected areas indefinitely uninhabitable are sufficient reasons for many to oppose nuclear energy. Some critics, such as Muellner et al., (2021) also argue that nuclear power’s contribution to mitigating climate change will be minimal (although their argument comes from a “main source of future electricity generation” rather than its efficacy as part of a greater diversified production strategy).¶ In addition to the environmental, structural, and capital damage caused by reactor failures, the safe transportation and storage of radioactive nuclear waste, (Gardoni & Murphy, 2015; Jacoby, 2020; Saraç-Lesavre et al., 2021; Siegel, 2020) the weaponization of uranium, which is the main fuel that is enriched and used to power nuclear reactors, (World Nuclear Association, n. d.) and concerns of nuclear war between both major nuclear states and actors outside the nuclear regime such as North Korea, (Grove, 2022; Pazzanese, 2022) make nuclear technology unacceptable for many.¶ Finally, opponents argue that the upfront capital cost and build time of nuclear reactors make them economically unsound, particularly as the cost of renewable production continues to fall and with the (until recently) relatively low cost of natural gas. (Dunai & Clercq, 2019; Ferguson, 2011; Lovins, 2021)¶ Proponents of nuclear energy argue that it plays a unique role in energy security by providing carbon-free, reliable, cost-effective energy. Meserve (2009) argues that nuclear power is an attractive energy source, not only in combatting climate change but in providing energy reliably and relatively cheap. Hassan et al. (2020) point out that nuclear energy can 16 contribute significantly to “ensuring energy security” while also reducing carbon pollution in developing nations and economies, such as the BRICS countries, where reliable, carbon-free energy is crucial.¶ In terms of safety, proponents argue that enhanced safety standards implemented since the Fukushima accident will ensure the continued safe operations of nuclear reactors. According to the World Nuclear Association (2022b), these standards have been effective since there have been no further accidents since their implementation. They also argue that current facilities for the transportation and storage of nuclear waste are sufficient. (Nuclear Regulatory Commission, 2021) Finally, proponents argue that the weaponization of uranium is unlikely because few non-nuclear states or non-state actors have the facilities to enrich uranium, which is usually enriched to between 3 and 5% for power production, (Center for Arms Control and Non-Proliferation, n.d.) to weapons-grade at 90%. (World Nuclear Association, 2017)¶ Despite the substantial capital costs of conventional Nuclear Power Plants (NPPs), which critics argue are unwarranted compared to the lower costs of renewable energy and natural gas, institutions such as the World Nuclear Association (2021b), the Nuclear Energy Association (2021), and scholars such as Rhodes (2018), Swanek (2018), and Ulmer-Scholle (2022) argue that nuclear energy has an overall lower cost long-term.¶ With new technology on the horizon in the form of, among other promising technological developments, Small Modular Reactors (SMRs), nuclear energy has the potential flexibility and adaptability to be a significant “resource in humanity’s arsenal in the fight against climate change” (Siegel) reliably and more cost-effectively. SMRs, according to Budinger & Bauman, will mitigate many safety concerns raised by nuclear opponents because they do not need water or giant cooling towers. They can operate with minimal manpower, thus mitigating the lack of technical capacity in many developing countries. The 17 design is inherently safe and includes automatic shutdown mechanisms in the event of an overheat (Cho, 2019; Parshley, 2021). Because of their small design, SMRs can also be constructed onsite, reproduced, transported, and deployed more quickly, efficiently, and at a lower cost than conventional large-scale reactors. (Fitzpatrick, 2017; Iurshina et al., 2019)¶ The International Atomic Energy Agency: A Nuclear Hegemon?¶ As Cox notes, international organizations, such as the United Nations, and the Bretton Woods institutions, such as the World Bank and International Monetary Fund (IMF), are mechanisms “through which the universal norms of a world hegemony are expressed.” He notes five attributes of international organizations that “express their hegemonic role:¶ (1) They embody the rules which facilitate the expansion of hegemonic world order;¶ (2) they are themselves the product of the hegemonic world order; (3) they ideologically legitimate the norms of the world order; (4) they co-opt the elites from peripheral countries and (5) they absorb counter-hegemonic ideas.”¶ The International Atomic Energy Agency (IAEA) is an autonomous international organization within the United Nations (IAEA, 2016). Within the U.N. system, it works with over 12 U.N. agencies, including close coordination with the U.N. Security Council and the European Commission within the European Union. It officially came into being on 29 July, 1957 with President Dwight Eisenhower’s ratification of the U.S. Statute. (IAEA). According to the Statute (2014), its objectives are to “accelerate and enlarge” the capacity of nuclear energy to promote peace and prosperity worldwide, contribute to improvements in health and medicine, and ensure that it is not used for military purposes. It also aims to enable “countries that were not among the advanced nuclear powers to take advantage of the nuclear age for a variety of uses and ensuring that nuclear facilities were not diverted from civil to military uses.” (de Blasio & Nephew)¶ As an actor, The IAEA procures over one hundred million dollars annually in goods and services, most of which are delivered to member states worldwide. The list of services 18 includes construction services and upgrades for nuclear facilities, disposal of nuclear waste, supplies, and equipment related to nuclear technology, raw materials for production, and goods and services related to safety and security. It serves a crucial role as the international safeguards inspectorate, which verifies compliance by non-nuclear weapon states with international rules under the NPT. As a resource, the IAEA’s initiatives and programs, as well as research and publications, are utilized by member states to pursue their interests, which range from energy production to medicine, health and food production, and ultimately to weapons policy.¶ Brown (2015) argues that the IAEA has established itself as an international nuclear authority and is “an autonomous agent of global governance”, having managed to gain considerable compliance and cooperation from the international community on its rules and services implemented. It has also established legitimacy by utilizing a strong policy bias relative to other international organizations.¶ The IAEA wields authority through two sources of independent power in international governance which Barkin (2013) identifies as moral authority and political entrepreneurship. Moral authority, he maintains, can be manifest in two areas. The first area is the legitimacy of the IAEA to act as an “official voice” and to command the global community’s attention on nuclear technology issues. Secondly, as Brown notes, favorable assets such as the ability to leverage economies of scale in its projects and its perceived apolitical nature both also give weight to its moral authority, which can compel states to comply or consent in certain policy areas.¶ Political entrepreneurship, according to Barkin, is a process by which specific political positions are advanced through governance mechanisms. Thus, the IAEA is able to wield power by focusing international attention on issues that they deem important, as Secretary-General Mohamed El Baradei did through his initiative to prevent the militarization 19 of nuclear energy and ensure safety in peaceful applications (United Nations, 2005) for which he and the IAEA were awarded the 2005 Nobel Peace Prize.¶ Considering that the IAEA is funded mainly by Member State contributions as well as some voluntary contributions, its activities logically reflect the interests of its biggest contributors. Findlay (2012) maintains that international organizations’ budgets are “determined by a combination of politics, history, organizational inertia, competing priorities, and the health of member states’ finances.” Therefore, despite its moral authority, legitimized by its role in the NPT and Nobel prize, the IAEA is nonetheless asymmetrically dependent on funding from member states and represents the western global order that many non-aligned nations are now challenging.¶ Recalling Cox’s five hegemonic attributes of international organizations, it can be argued that the IAEA does embody rules that facilitate the expansion of the hegemonic world order. However, its activities are limited mainly to safety and security and therefore do not play a significant role in influencing states’ behavior in geopolitics. While it is a product of the hegemonic world order and legitimates its norms, those norms are still defined by western values that are informed in a decidedly unidirectional manner. By perpetuating what can be perceived as western values, it could be argued that the IAEA continues to promote western hegemonic ideas versus absorbing counter-hegemonic ideas. Based on Cox’s criteria and the IAEA’s limited capacity to influence and inform the geopolitical behavior of states beyond areas of nuclear safety and security, not to mention the internal challenges it faces to function properly in even this capacity, this work concludes that it is not a hegemon.¶ Russia: The World's One-stop Nuclear Shop¶ Over the last two decades, Russia has become the world's go-to supplier of nuclear technology, especially for countries new to the civilian nuclear market. She is deeply experienced in constructing and maintaining nuclear plants, has considerable industrial and scientific capacity, as well as market share of the global uranium supply, and has the capacity 20 to reclaim spent nuclear fuel from client states. By positioning itself as a one-stop-shop for reactors, fuel supply and reclamation, financing, and worker training, (Lovering & Halland, 2022) Russia embodies the Dependency dimension of Nuclear Hegemony.¶ Russia's rise as a nuclear energy player started in 2006 with the Kremlin's $55-billion plan to become a "leading global supplier of nuclear power". (Conant, 2013) By 2014 Russia had built 37 percent of all new nuclear reactors, compared to the US's 7 percent. (Lecavalier, 2015) Of the 439 nuclear reactors currently operating globally, 38 generate electricity in Russia. Additionally, 42 Russian-designed VVER reactors operate in Armenia, Bulgaria, Czech Republic, Finland, Hungary, India, Slovakia, and Ukraine, and an additional fifteen were under construction in Bangladesh, Belarus, China, Finland, Hungary, India, Iran, Slovakia, and Turkey as of 2021. (Bowen & Dabbar, 2022a) She has signed bilateral nuclear cooperation agreements with a total of 47 countries and has nuclear energy footprints in Africa, Asia, the Middle East, and South America. (Lovering & Halland, 2022)¶ According to the IAEA, (2021) Russia enjoys competitive strength in nuclear energy through its technological capacity, which includes intellectual property, manufacturing infrastructure, and workforce. Through its state-owned atomic energy corporation, Rosatom, Russia is able to "oversee and work at all stages of the nuclear fuel cycle and production chain, from uranium mining to decommissioning of nuclear facilities or management of spent nuclear fuel", which enables it to construct and operate nuclear reactors safely and economically. This makes it an attractive partner for energy-hungry states, especially developing states with limited capacity and financial resources.¶ She is also able to exercise considerable power in the nuclear Supply Chain through the considerable market share capture (Sallee, 2021) of many of the components of energy production. Through Rosatom, Russia controls key facilities in the mining, milling, conversion, and enrichment of uranium, as well as fuel fabrication and the manufacture and 21 distribution of "equipment, parts, and services for nuclear reactors." (Bowen & Dabbar, 2022b) According to Lovering & Halland, (2022) Russia controls nearly half of the global uranium enrichment capacity. Together with Kazakhstan and Uzbekistan, they supply half of the U.S.'s nuclear power imports and nearly 40 percent of Europe's.¶ Currently, Rosatom is the only nuclear supplier that can reclaim spent nuclear fuel from foreign clients to temporarily store and reprocess. (Kim, 2021; Schepers, 2019) Considering that most developing states and emerging economies lack the capacity to safely manage nuclear waste (which can potentially be weaponized) and considering that proper storage and management continue to challenge even developed states, the reclamation of spent fuel makes Russia not only an attractive supplier for "nuclear newcomer states", (Kerr, n.d.) but also offers a strong counter-narrative against criticism of her lax safety standards (Stulberg et al., 2021) and provides safeguard mechanism nuclear waste.¶ Since Rosatom is a state-owned enterprise (SOE), Russia can easily penetrate the nuclear export market by offering client states government subsidized loans with favorable terms that the U.S. cannot match. (Hayunga, 2020) Like China, this gives the Russian government direct and complete control over not only the construction of nuclear equipment and supply chains but also financing. This gives both countries a competitive advantage over the U.S., whose Export-Import Bank (EXIM) lending schemes are regulated by the Organization for Economic Cooperation and Development's (OECD) Arrangement on Officially Supported Export Credits which severely limited the financing of its nuclear exports until recently. (Nakano)¶ Ultimately, this means that Russia can establish a nuclear foothold in many client states efficiently and cheaply. In addition to financing 90% of the Rooppur Nuclear Power Plant in Bangladesh, and nearly 50% of the El Daaba reactor in Egypt (Schneider et al., 2018), Rosatom also offered to fund 100% of a nuclear project in Hungary, though Hungary 22 ultimately accepted a lesser amount. (Saha, 2017). Most Russian NPPs are built under EPC (Engineering, Procurement, and Construction) or "turnkey" contracts, (Lieu, 2020) where Rosatom designs and builds the reactors and then hands them over to the client state's utility company. (Schepers, 2019) However, the Akkuyu reactor in Turkey, which is currently under construction, was contracted under a "Build-Own-Operate" (BOO) agreement, where Rosatom will finance and retain ownership of the estimated $22 billion project (Schneider et al.) and sell electricity back to Turkey (Sallee, 2021) While the financial efficacy of the BOO remains to be seen, Russia's energy strategy is proving to be a reliable source of income. As Schepers notes, from Rosatom's 2017 "Performance of State Atomic Energy Corporation" report, more than one-third of Rosatom's international revenue came from NPP constriction.

<<LINE BREAKS CONTINUE>>

**By establishing itself as a one-stop shop for nuclear energy production** that includes "flexible financing options, training opportunities, and support with developing nuclear infrastructures related to safety, security, non-proliferation and export control requirements", (Schepers, 2019) **Russia has ensured that its clients will remain dependent for all aspects of production and for a long time, considering the length of nuclear projects**. It also ensures a steady income stream with the potential for parallel long-term partnerships in other areas of cooperation with its client states. **It is, therefore, positioned to leverage its control of the supply chain to exert influence over its clients in the greater geopolitical environment over a long period of time**. Given current events, this is concerning. As Russia controls a substantial supply of the world's natural gas, which it has been accused of politicizing and weaponizing. (Eddy & Stevis-Gridneff, 2022; Sabadus, 2022) the implication that it could employ a similar strategy with nuclear power is obvious. By controlling 40% of the global uranium conversion market and 46% of global uranium enrichment capacity, (Bowen & Dabbar; 2022b) **Russia could easily disrupt the energy supply of any country dependent on it**. This potential threat is not limited to prospective client states, as evident by the fact that **despite its activities in Ukraine, Russia's uranium exports have yet to be sanctioned**. (Arai & Hanawa, 2022; Freebairn, 2022; Hunnicutt & Scheyder, 2022; Wesolowsky, 2022)

Consequently, **it can be concluded that Russia is exercising its Nuclear Hegemony by virtue of establishing a firm system of dependency through which it can exercise power** over other states. While the cooperative nature of its bilateral agreements implies power by consent, the coercive, realist potential is nonetheless apparent.

China: Financing the Global Nuclear Belt

China's geopolitical nuclear power strategy is best conceived as a component of her Belt and Road Initiative (Ramana, 2022; Yi, 2018), which is branded as "a transcontinental long-term policy and investment program which aims at infrastructure development and acceleration of the economic integration of countries along the route of the historic Silk Road" (BRI, n.d.) that is intended to connect Asia, Europe, and Africa (Chatzky & McBride, 2020)

The BRI is a two-pronged initiative consisting of a land corridor, known as the Silk Road Economic Belt (SREB), and a sea corridor, known as the Maritime Silk Road (MRS), that will connect China with Europe and strategic sites in Africa through infrastructure projects related to energy, commerce, and transportation. (Kim, 2021) So far, 143 countries have agreed to participate in the BRI with about $8 trillion of announced investments. (Sandalow, 2019) When completed, the BRI will span over 70 countries, representing 60% of the global population and nearly 30% of the global GDP. (Sarwar, 2018)

The SREB has three main routes through Eurasia: the northern route from China to Northern Europe via the Eurasia land bridge through Russia to Germany; the middle route consisting of oil and gas pipelines running from Beijing to Paris via Afghanistan and Kazakhstan; and the southern route consisting of transnational highways running from Beijing through Southern Xinjiang, Pakistan, Iran, Iraq, Turkey, Italy, through to Spain. (Sarwar) The MRS meanwhile aims to establish a seabound network by developing, constructing, expanding, and operating ports, industrial parks, and special economic zones (SEZs) throughout the South China Sea and the Indian Ocean. (Ghiasy et al.,2018)

Sarwar argues that, unlike the original Silk Road, which facilitated trade and cultural exchanges between the east and west, the BRI is not only "an overt expression of China's power ambitions in the 21st century” but is also a geopolitical tool for China to counter the U.S.'s geopolitical pivot to Asia, and function as a foundation of a new global economy centered around China. Ayres, (2017) and Hillman & Sacks, (2021) and Zhang (2018) likewise caution about the political and economic threats that the BRI represents, not only to the west but also to BRI host countries.

Other scholars, such as Jin, (2017) suggest that China, BRI host countries, and even peripheral countries will benefit from the improved political and diplomatic relations that will be facilitated by the enhanced infrastructure connectivity, deepening economic cooperation, and person-to-person interactions facilitated by the BRI.

Kim (2021) conducted extensive research for the Wilson Center on **the nuclear energy aspect of the BRI, which she notes is** "**important and understudied**." China's global nuclear strategy, which aims at global dominance in high-tech sectors, was articulated in its 10-year "Made in China 2025" industrial policy in 2015. Through the BRI, she aims to build up to 30 overseas nuclear reactors by 2030, having (Reuters, 2019b) already built four nuclear reactors in Pakistan, with the goal to build 2 more. (Parameswaran, 2015; Tabeta, 2020) She is also in various stages of development of nuclear energy programs in Romania, Argentina, Brazil, the UK, Iran, Turkey, South Africa, Kenya, Egypt, Sudan, Armenia, The Philippines, Kazakhstan, and Saudi Arabia. (Rogers & Crow‐Miller, 2017; WNA, 2022b)

China's domestic nuclear market has grown substantially over the last three decades. Driven by increasingly poor air quality from coal-fired power plants in the 1970s, Beijing began to develop alternative energy sources. (Fairley, 2018; WNA) Therefore, Beijing began to invest heavily in domestic nuclear energy production.

Currently, China develops, constructs, and operates nuclear reactors through its three state-owned nuclear agencies: the Chinese National Nuclear Corporation (CNNC), the China General Nuclear Power Group (CGN), and the State Power Investment Corporation (SPIC) (WNA).

China's substantial investment in its nuclear industry (Baker et al., 2017) has enabled it to develop an array of domestically produced reactor models, such as the Hualong One (whose design is based on western technology) and is protected by intellectual property rights. (Reuters, 2019a) The first exported Hualong One reactor began construction in Pakistan in 2015 and commenced operation in May 2021. It is expected that China will ultimately construct a total of six nuclear reactors in that country. (ANS, 2021) According to Sallee, this homegrown reactor will give China access to new revenue streams and facilitate the building of stronger partnerships abroad. It is also representative of "China breaking the monopoly of foreign nuclear power technology and officially entering the technology's first batch of advanced countries."

Like Russia, China is able to penetrate the foreign nuclear market by offering generous and flexible financial terms, such as low-interest and concessionary loans with long grace periods (Chatzky & McBride; Mehta, 2020) to client states for whom nuclear reactors would otherwise be unaffordable. (American Security Project, 2019; Bastian, J.; 2021; Chatzky & McBride; Kim) **Since these contracts often lack transparency**, (Bastian, Gupta, and Hurley et al.) client states are likely not fully aware of what they are committing to.

According to Bing-Ming (2021), these financial arrangements, and the length of time of nuclear projects equate to a "marriage [that] is not easily dissolved." He goes on to explain that if a client state enters into a nuclear agreement with China and then decides to suspend the project in the pre-construction phase, it is liable for sizeable damages to China for breach of contract. Once reactor construction has begun, Bing-Ming continues, "the marriage is truly ironclad." **This is because China, like Russia, has developed a supply chain that includes partnerships for uranium imports with BRI partners Namibia and Kazakhstan** (WNA, 2021a), as well as control of equipment, technology, workforce, and waste disposal supplies and facilities by her state-owned nuclear utilities, **rendering the client state dependent over a long time**.

Some critics claim that China's financial strategies harm client states, leaving them vulnerable and dependent on China. (Ayres, 2017; Brattberg & Soula, 2018; Chatzky & McBride, 2020; Hurley et al., 2021) **Others**, such as Gupta (2020) and Mehta, **suggest that they are a deliberate tactic to lure states into** "**debt traps**" **through which China can secure a long-term foothold in other countries and acquire control of their resources and strategic locations**.

In any case, the debt crises in many of China's client states are causing concern. The situation is particularly dire in Africa, where China is the top lender. (Chaudhury, 2021) Despite denial by the Kenyan government, concern remains that Kenya could lose its port in Mombasa to China over its struggles to repay its $50 billion debt. (Chaudhury, 2019) Angola is likewise having to repay its debt in crude oil, (Pandey, 2018) leaving little for the country. Elsewhere, Tajikstan reportedly ceded 1,100 kilometers of disputed territory to China in exchange for debt forgiveness for an unspecified amount. (Gupta, 2020) China also assumed an 85% stake in the Hambantota Port in Sri Lanka under a 99-year concession for the $1.1 billion package for the construction of the port.

From a hegemonic standpoint, we could consider China's nuclear strategy as a synthesis of the liberal and constructivist approaches. Its nuclear programs consist of bilateral agreements based on consent that have the dual potential to fulfill client states' energy needs while affording China access to resources it needs to manage its domestic challenges. China is also incorporating new ideas and approaches by partnering with client states outside the traditional nuclear regime while embarking on one of the most ambitious infrastructure programs in history.

Throughout this analysis, we must heed our contemporaries' warning that in any hegemonic relationship, coercion is always implied. China is in various stages of nuclear cooperation with the Philippines, Thailand, Singapore, Cambodia, Sri Lanka, Sudan, Kenya, and Namibia, (WNA, 2022f) who are all participating in the BRI. (FSIF, 2021) Suppose we frame China's nuclear export strategy within the context of the BRI. In that case, it is easy to envision a coastal nuclear maritime route from China through the highly contested Malacca Strait (Greco, 2022) around the Indian Ocean and back.

Therefore, it could be argued that China is building hegemony in nuclear energy by establishing a supply chain that includes fuel, technological know-how, hardware, manpower, and disposal, similar to Russia. **Driven by the aspirations of the BRI, it has been able to expand its hegemonic footprint by offering innovative and relatively affordable reactors with appealing financing terms that, while offering its client states cheap, reliable, and low-carbon energy could also render them not only dependent but also obligated for nearly a century if they default**. Therefore, the latent coercive implications of hegemony are always there.

#### Decline causes extinction.

**Ero '25** [Comfort Ero; President and CEO of the International Crisis Group; Richard Atwood; Vice president of the International Crisis Group; 01-01-2025; "10 Conflicts to Watch in 2025"; Foreign Policy; https://foreignpolicy.com/2025/01/01/conflicts-2025-syria-sudan-gaza-ukraine-iran-haiti-mexico-myanmar-korea-china/; accessed 04-01-2025] leon

Generalizing about what drives the turmoil is hard, given each conflict’s distinct roots.  **China and Russia**—**and to some degree, North Korea**—**are challenging orders that were underpinned for decades by U.S. power in Asia and Europe**. Elsewhere, **absent a hegemon or concert of big powers acting in unity, more leaders sense constraints crumbling**. **More see opportunities to pursue ends by violent means or fear losing out if they hold back**.

Most governments, of course, do not seek to crush rivals at home or sponsor proxies abroad, let alone annex neighbors or kill civilians en masse. But more are taking things into their own hands. Increasingly, the main check on their actions is how much fight their foes can put up.

If adventurism is on the rise, its knock-on effects—how rivals sensing the same loosened fetters might react—are harder to foresee. Interlinked conflicts make unintended consequences likelier. Yahya Sinwar, the Hamas leader who masterminded the Oct. 7 assault, surely underestimated the ruin that a largely unrestrained Israel would wreak on Gaza in response.

Even Israel, for all its spycraft, did not predict that its hammering of Hezbollah in Lebanon would help a reformed al Qaeda offshoot seize Damascus. (Syria’s new ruler, despite his jihadi past, says he’s not looking for a fight with Israel.)

Trump’s return brings fresh uncertainty. In Europe, the Asia-Pacific, and the Middle East, Trump’s promises are often contradictory, as are the views of his cabinet picks and loyalists. If he doubles down on confrontation, how much risk will he tolerate? If he seeks deals, what trade-offs might they entail, and what might the implications be for U.S. allies? Outside those arenas, if Washington is largely absent, how will others fill the space?

Trump’s admirers see virtue in impetuousness. **Keeping rivals and allies on their toes can deter the former and extract concessions from the latter**. **Putin, they say, was shyer of acting up with Trump in office, and Trump’s ambiguity about NATO has shaken Europeans out of their complacency** about the continent’s security just as much as the Kremlin’s aggression has.

But unpredictability could just as easily backfire. **While no one wants all-out war, miscalculation is as much a risk along major-power fault lines as elsewhere**. If Trump or top officials get too hawkish, a rival could respond in kind, aiming to reset a red line but crossing one of Washington’s own. **Or a U.S. ally**—the Philippines, say, or Taiwan or Israel—could overstep, **prompting retaliation from China or Iran that risks dragging in the United States**.

On the other hand, if Trump disparages Washington’s alliances, an adversary—**Moscow, most likely, but plausibly Pyongyang or even Beijing**—**could decide to test Trump’s willingness to come to the aid of U.S. allies, prompting a political uproar in Washington that forces the president’s hand**.

### 1AC---Adv---Grid

#### Cyber & EMP attacks are coming.

**Owen ’23** [Joshua; Research Fellow @ the United States Naval Institute, Gunnery Sergeant in the U.S. Marine Corps; February; U.S. Naval Institute; “An EMP or Solar Incident Could Result in Blackout Warfare,” https://www.usni.org/magazines/proceedings/2023/february/emp-or-solar-incident-could-result-blackout-warfare; DOA: 3-3-2025] tristan

A coordinated physical attack on multiple targets and facilities from a state or nonstate actor must be considered an imminent threat. **An attack on an unprotected civilian grid could result in a long-term blackout event**. Since 99 percent of the military depends on the civilian electric grid and food and water infrastructure, the military could be severely crippled.

Norman Angell’s 1910 book, The Great Illusion, postulated that there might be no more great wars because Europe and the United States were so interdependent—war would be bad for business. Only four years later, World War I started. And yet, something like Angell’s ideas again hold sway. If the United States and its economy collapsed, the entire world would suffer. Why would China, Russia, or any other nation risk their country's economic growth? Why would they risk more and more sanctions on trade? But in totalitarian countries, the goal of leaders is to stay in power, not help their least powerful citizens. As Pry notes:

**Totalitarian and authoritarian states see international relations as a** “**zero-sum game**” in which there are winners and losers, the living and the dead. Economics is not the highest priority for totalitarian states. **Their highest priority is total control over the world, whatever the cost, because they believe that any nation not their slave is a potential threat and war is inevitable**. Totalitarian states want to be the last man living and make everyone else a slave or dead. **That is why they are willing to do anything to crush their enemies and win**. **EMP/Cyber Warfare**, what I term blackout warfare, **is a relatively easy, low-risk**, even benign form of warfare **compared to all-out Nuclear, Biological, and/or Chemical Warfare**—**all of which Moscow and Beijing are prepared and willing to do if they can win**.

If Pry is correct, **these leaders do not need a** “**why**” to launch a full-scale combined arms blackout war on the United States—**they are biding their time for** “**when**.”

Get Real, Get Ready

**This threat will materialize sooner or later**—probably sooner. **Leaders need to take it seriously and begin to act now**. As for the Navy and Marine Corps, they and the other armed services should introduce existing technologies for electromagnetic hardening of infrastructure and systems for military equipment, bases, and vehicles as quickly as possible. Senior commanders can submit a Universal Needs Statement (UNS) to their chains of command, and small unit commanders can begin to study how to command and control in an electronically degraded environment—useful in a variety of possible contexts. **Hardening efforts can begin to take place in phases, based on budgets for the year**.

#### Trump magnifies risk.

**Kirchgaessner ’25** [Stephanie; Deputy Head of Investigations for Guardian US; February 28; The Guardian; “Trump administration retreats in fight against Russian cyber threats,” https://www.theguardian.com/us-news/2025/feb/28/trump-russia-hacking-cyber-security; DOA: 3-3-2025] tristan \*\*brackets r og\*\*

The **Trump** administration has publicly and privately **signaled** that it does **not** **believe** Russia represents a **cyber** **threat** against US national **security** or **critical** **infrastructure**, marking a radical departure from longstanding intelligence assessments.

The **shift** in **policy** could make the **US** **vulnerable** to **hacking** **attacks** by **Russia**, experts warned, and appeared to reflect the warming of relations between Donald Trump and Russia’s president, Vladimir Putin.

Two recent incidents indicate the US is no longer characterizing Russia as a cybersecurity threat.

Liesyl Franz, deputy assistant secretary for international cybersecurity at the state department, said in a speech last week before a United Nations working group on cybersecurity that the **US** was **concerned** by threats perpetrated by some states but only named **China** and **Iran**, with **no** **mention** of **Russia** in her remarks. Franz also did not mention the Russia-based LockBit ransomware group, which the US has previously said is the most prolific ransomware group in the world and has been called out in UN forums in the past. The treasury last year said LockBit operates on a ransomeware-as-service model, in which the group licenses its ransomware software to criminals in exchange for a portion of the paid ransoms.

In contrast to Franz’s statement, representatives for US allies in the European Union and the UK focused their remarks on the threat posed by Moscow, with the UK pointing out that Russia was using offensive and malicious cyber-attacks against Ukraine alongside its illegal invasion.

“It’s **incomprehensible** to give a speech about **threats** in cyberspace and **not** **mention** **Russia** and it’s **delusional** to think this will turn Russia and the FSB [the Russian security agency] into our friends,” said James Lewis, a veteran cyber expert formerly of the Center for Strategic and International Studies think tank in Washington. “They **hate** the **US** and are still mad about losing the cold war. Pretending otherwise won’t change this.”

The US **policy** **change** has also been **established** behind **closed** **doors**.

A recent memo at the Cybersecurity and Infrastructure Security Agency (**Cisa**) set out **new** **priorities** for the agency, which is part of the Department of Homeland Security and monitors cyber threats against US critical infrastructure. The new directive set out priorities that included China and protecting local systems. It did **not** **mention** **Russia**.

A person familiar with the matter who spoke to the Guardian on the condition of anonymity said **analysts at the agency were verbally informed** that they were **not** to **follow** or **report** on **Russian** **threats**, even though this had **previously** been a **main** **focus** for the agency.

The person said **work** that was being **done on** something “**Russia**-related” was in effect “**nixed**”.

“Russia and China are our biggest adversaries. With all the **cuts** being **made** to different agencies, a lot of **cybersecurity** **personnel** have been **fired**. Our **systems** are **not** going to be **protected** and our **adversaries** **know** this,” the person said.

The person added: “People are saying Russia is **winning**. Putin is on the **inside** now.”

The New York Times has separately reported that the Trump administration has also **reassigned** **officials** at **Cisa** who were focused on safeguarding elections from cyber-attacks and other attempts to **disrupt** **voting**.

Another person who previously worked on US joint task forces operating at elevated classification levels to track and combat Russian cyber threats said the development was “truly shocking”.

“There are **thousands** of US government **employees** and **military** working daily on the **massive** **threat** **Russia** **poses** as possibly the most significant nation state threat actor. Not to diminish the significance of China, Iran or North Korea, but Russia is at least on par with China as the most significant cyber threat,” the person said.

The person added: “There are **dozens** of discrete **Russia** state-sponsored **hacker** **teams** **dedicated** to either producing **damage** to US government, **infrastructure** and commercial interests or conducting information theft with a key goal of maintaining persistent access to computer systems.”

#### Investment solves.

**Curtis ’24** [Steven; Consultant @ the Readiness Resource Group; February 15; National Defense University Press; “Microgrids for the 21st Century: The Case for a Defense Energy Architecture,” https://ndupress.ndu.edu/Media/News/News-Article-View/Article/3678506/microgrids-for-the-21st-century-the-case-for-a-defense-energy-architecture/; DOA: 3-2-2025] tristan

The Department of Defense (**DOD**) needs a **new** **approach** to electrical grid **infrastructure** to maintain **security** and access to operational energy. Recent **natural** **disasters** and **cyber**-**attacks** have exposed the **vulnerability** of the current system, posing threats to military operational **readiness**. Strategic **military** **facilities** currently acquire most of their electric **power** directly from the national **grid**, which is increasingly **vulnerable** to failures. The problems experienced to date could be **exponentially** **worse** if targeted by a **sophisticated** **adversary** with **advanced** offensive cyber **capabilities**, such as Russia or China. Simultaneously, the growth of renewables and increased DOD demand for carbon-free energy create challenges and opportunities for operational energy. To date, only a **small** fraction of **work** has been done to **create** a **system** for DOD energy that is robust, responsive, and reliable.

A **Defense** **Energy** **Architecture** (DEA) should address these **issues** by providing a **comprehensive** **approach** to **microgrid** **implementation** for defense installations and deployable energy capabilities. A DEA would simultaneously deliver increased infrastructure security and carbon-free energy with an **advanced** **microgrid** **system** based on small modular reactor (**SMR**) **nuclear** **power** and renewables, such as wind and solar, when they are available. A DEA should also emphasize the development of energy storage applications beyond batteries, specifically hydrogen. A fully integrated system of baseload (that is, on all the time) electricity production, renewables, and energy storage is necessary to maximize the benefits to DOD in both permanent installation and expeditionary environments. The focus of a DEA should be on efficient resources based on the requirements of each base in which the microgrids would be employed.

DOD needs to advance microgrid systems for several reasons. First, DOD has energy assurance and resilience needs that significantly exceed most civilian requirements, and it therefore requires a separate system for energy production and storage. Second, as one of the **largest** single **energy** **consumers** in the **world**, DOD has the **scale** to **create** a **market** **demand** signal **strong** enough to **encourage** private **investment** and drive down hardware **costs**. Finally, with suitable guidance, DOD could move quickly to reach net-zero carbon goals for energy production.

The **defense** **grid** system and energy production mechanisms must improve to **increase** **resilience** to natural **disasters** and **terrorist** attacks on the national grid and integrate clean energy improvements in a cogent manner. This article defines the concept of a Defense Energy Architecture that may guide the construction of microgrid systems to supply desired energy production while supporting energy independence, security, resiliency, and affordable power. We further recommend that DOD integrate emerging energy concepts, in both garrison and expeditionary environments. Advances in modern energy technologies provide many opportunities for DOD to modernize, increasing security and operational capabilities.

DOD Reliance on the National Electric Grid System and Vulnerabilities

The national grid was designed with one purpose: to deliver electric power from the source of production to end users. However, at the time of its creation, there was little thought given to things such as redundancy in natural disasters and certainly none given to potential problems that could not be imagined at the time, such as **cyber**-**attacks** and electromagnetic pulse (**EMP**) **weapons**. For the **security** of the **Nation**, DOD must ensure that it has continuous access to **energy**, making the entire **defense** system more robust and able to **withstand** the **emerging** **threats** of 21st-century warfare.

America’s electrical grid is the system that powers the garrison operations of DOD and provides a platform for the application of military power worldwide. For decades, the reliability of the grid system was such that the military was confident that when electricity was needed, it would be there. However, this basic assumption is being questioned as the national grid ages, shows vulnerabilities, and grapples with the challenges of incorporating distributed electricity-generating sources like solar and wind energy.1 These shortcomings—coupled with the realization that the existing system is **vulnerable** to **disruptions** from incidents both **natural** (hurricanes and solar flares) and **man**-**made** (cyber-attacks and EMPs)—call for more direct control by DOD of energy production systems.

However, rather than simply moving ahead with its current course, DOD should embrace best-in-class technologies to ensure that it is moving forward with the best solutions. Moreover, the system needs to be flexible enough to incorporate new technologies as they evolve to ensure that best-in-class remedies are delivered to address the changing nature of power generation and increasingly sophisticated potential attacks on critical infrastructure.

The current grid system struggles to deal with **vulnerabilities** that could **disrupt** **power** and **harm** American **security**, including potential **attacks** by **foreign** **adversaries** or **terrorists**. For many, Superstorm Sandy in 2012 was a wakeup call—it demonstrated a potential for widespread damage that could affect the national electrical grid, leaving 8.5 million people without power across 21 states.2 However, to those watching closely, Sandy was not an anomalous event but rather more of a culmination of a long-term trend that has revealed how susceptible the grid is to disruption from severe weather, including wildfires and extreme temperatures.3 The **potential** for **disruptive** **events** seems to be **increasing**.

As devastating as these natural events have been, many national security experts predict that damage from man-made attacks could be multiple times worse. The insurance company Lloyd’s of London has modeled a plausible scenario in which a **cyber** **attack** on the **Eastern** **Interconnection**, which services approximately **half** of the **United** **States**, could leave large areas—including dozens of military installations—**without** **power** for days.4 This is not a distant theoretical scenario: **Russia** has already **demonstrated** the **ability** to **successfully** **attack** electrical **grid** **infrastructure** in **Ukraine**, and **China** is believed to have **similar** offensive cyber **capabilities**.5 Additionally, the ransomware attacks on Colonial Pipeline in 2021 demonstrated that **criminal** **organizations** and other **nonstate** **actors** also **possess** the **tools** to sow **chaos** in American energy infrastructure.6 The national grid is **susceptible** to **large**-**scale** **disruption**, whether from devastating **natural** **weather** events, military **attacks** from near-peer competitors, or terrorists or international crime syndicates. Therefore, response **readiness** largely **depends** on a **secure** supply of **electricity** from the main grid.

We know that the military is susceptible to the same threats that menace civilian energy infrastructure. In recent years, weather events have disrupted energy service to military installations, such as Tyndall Air Force Base during Hurricane Michael in 2019 and Joint Base San Antonio–Lackland and others during the winter storms of February 2021.7 While the effect on operations was relatively minor in these instances, it does not take much to imagine that targeted attacks on military infrastructure could be orders of magnitude more harmful and severely impact readiness. DOD recognizes this possibility and has conducted a series of exercises to better understand “the growing threat associated with natural or nefarious events . . . such as missions being separated from access to the national grid.”8 The effects from such events could have major consequences on the military’s ability to respond rapidly to crises.

Defense Energy Architecture

The goal of a DEA is to ensure that the advancement of microgrids for DOD use is comprehensive and standardized. A **microgrid** can be defined as “a local energy grid with control capability, which means it can **disconnect** from the **traditional** **grid** and operate **autonomously**.”9 For our purposes, we believe this encompasses both energy generation and storage. Defining the concept must not only focus on near-term needs, but also keep options open for future adaptations. It is beyond the scope of this article to prescribe what a fully functional standard for a DEA would look like. However, we can outline key principles that must be addressed to answer the challenges that face the future of DOD energy systems. The following should be considered as the essential tasks for a DEA to address the emerging energy needs:

provide carbon- and pollution-free energy and baseload power as much as possible

provide continuous energy on demand

provide defense against attacks and resilience in the case of natural disasters

provide expeditionary capability.

Provide Carbon and Pollution-Free Energy

In recent years, DOD has increasingly focused on the potential threats posed by climate change. An example of this is the Army Climate Strategy, which set goals for 100 percent carbon- and pollution-free electricity for Army installations by 2030.10 Given this policy priority, we believe a DEA should follow the same path. The current focus for the source of this energy is renewables, primarily solar and wind. However, wind and solar power suffer from the fact that they are intermittent (they supply energy only about 30 percent of the time, and wind is not predictable). This creates reliance on fossil fuel–based electrical plants to meet operational demands for energy, which not only runs counter to low carbon goals but also maintains the vulnerable linkage to the main grid.

An ideal solution to this intermittency problem is to use small modular reactors (**SMRs**) to **integrate** baseload **nuclear** **energy** as the carbon-free backup for solar and wind. In 2021, 60 percent of the electricity generated in the United States came from natural gas and coal.11 So when renewables are not available in the desired amount, DOD and other electricity consumers plug into a system that generates over half its power from carbon-producing and -polluting resources. Instead of backing up renewables with fossil fuels, SMRs can assure that clean energy is available on demand. This shift would allow DOD to phase out fossil fuels in the energy mix over time. Each individual installation could be configured to maximize the natural resources available—for example, relying more on wind for installations on the Great Plains. Once the optimal mix of renewables is designed, SMRs would be deployed to make up the balance. The units are modular and can be added to provide more energy. This would **enable** DOD **installations** to **sever** themselves completely from the **national** **grid** over time and achieve clean energy goals.

Provide Continuous Energy on Demand

A second aspect of a DEA is to ensure the availability of continuous operational energy. Again, the intermittent nature of renewables causes issues with instantaneous accessibility to energy. For an organization with 24/7 operational needs, this would not do. Much of the DOD focus thus far has been to look at **battery** **storage** to preserve the electricity generated by solar and wind sources.12 However, lithium-ion batteries, which are the current state of the art, are best suited for intra-day storage, as their ability to store energy competitively is capped at around **8 hours**.13 In a normal operating environment, this is possibly adequate since it provides overnight storage and dispersion when demand for electricity is low. However, in a crisis scenario when high energy loads are present around the clock, this may **lead** to **shortfalls**. In addition, if a **natural** **disaster** took **solar** and **wind** capabilities **offline**, battery storage capability would be diminished rapidly after only a few hours. Therefore, a truly **independent** microgrid **system** should have **autonomous** **power** that could be provided in the case of a prolonged interruption.

While **SMRs** are ideal for providing **continuous** **energy**, a microgrid system should have backup power available in case the unit does need to go offline for any period. As stated, batteries have limited ability to provide anything beyond intra-day energy storage, which itself is a system vulnerability. **Hydrogen** has much greater capability to **integrate** with a **microgrid** **system** to meet energy storage needs. Hydrogen can be produced by splitting water molecules (H20) into their component parts of H2 and elemental oxygen. When this is done with renewable electricity, the resulting hydrogen is carbon-free or “green.” Once hydrogen is formed, it can **store** **energy** indefinitely.14 Therefore, H2 could maximize the total amount of energy produced by renewables.15

Furthermore, **hydrogen** can be **produced** by **nuclear** **power**, so it is also carbon-free and can store an almost **unlimited** amount of **energy**. **Infrastructure** investments would be **required** to store the hydrogen in a safe manner, but this is currently done globally in many industries that use hydrogen. If the SMR ever went down, **hydrogen** could provide a long-term **bridge** of **operational** **energy** until the issue was resolved. Though currently less efficient for short-duration storage than batteries, the flexibility that hydrogen provides in a microgrid system makes it extremely valuable for **energy** **assurance**. In fact, coupling hydrogen with battery storage may provide the most overall benefit for the entire system.

Provide Security and Resiliency

A third requirement for a microgrid system for defense use is the ability to safeguard it from potential attacks. We have noted that one of the vulnerabilities of the current grid is susceptibility to cyber attacks. The nature of warfare is constantly evolving. A World War I–era general transported to the 21st century would barely recognize how warfare is conducted in the age of long-range missiles, precision-guided munitions, and stealth bombers. It is not difficult to believe that future warfare may become as unrecognizable to us, since the main contested spaces in the future might not be air, land, and sea but space and cyberspace.

A **tipping** **point** may have been **reached** already with **advances** in the sophistication of **offensive** cyber **capabilities** and society’s increasing **reliance** on digital **tech**nology.16 The national electric **grid** is **vulnerable** because of **age** and the **threat** to the Supervisory Control and Data Acquisition (**SCADA**) **control** system from **cyber** **attacks**. An additional threat comes from **EMP** **weapons**, which deliver a pulse of energy from a nuclear or electromagnetic detonation “that creates a powerful **electromagnetic** **field** capable of **short**-**circuiting** a wide range of **electronic** **equipment**,” including computers and telecommunications equipment.17 The conventional grid is **exposed** to **EMP** **attacks** in the form of high-voltage control cables and transformers that regulate the grid. High-voltage transformers take 2 years to build, and the United States is inadequately stocked with backup transformers. Thus, a **large**-**scale** EMP **attack** could **bring** **down** a large section of the **grid** for an extended time.18

Certainly, military operational readiness would **suffer** if military **installations** were **still** **integrated** in the national grid at the time of such an attack. Again, this is not a scenario found only in science fiction novels and dystopian Hollywood films. Today, **China** is already believed to **possess** **super**-**EMP** **weapons** and to have **developed** **procedures** to execute a **first** **strike**.19 This rationale is arguably enough for DOD to explore alternative power delivery systems to maintain response capabilities in the event of such an assault.

Fortunately, a microgrid system based on **SMR** **technology** has significant **defensive** **advantages** to the national grid. First, by definition, a microgrid is a discrete system that provides power locally. An SMR acts as an “**island** of **power**,” which **decouples** from the larger **grid** and from other military installations, so a successful attack on one installation would be an **isolated** **incident** and not a **systemic** **failure**. In the case of a cyber-attack or EMP detonation on the **larger** grid **infrastructure**, a military **microgrid** would simply **not** be **affected** because it is **separate** from the rest of the **system**.

Direct **cyber**-**attacks** on **microgrid** infrastructure are also **possible**, but this infrastructure is more **resilient** because of its **independent** computer **control**. We recommend that both **buried** **SMRs** and underground power lines are a **standard** part of a DEA microgrid configuration. By virtue of being below surface, they are **less** **vulnerable** to overhead **EMP** **explosions**, which is not an option for systems based on solar panels and wind turbines. Increased sophistication and sheer volume of monitoring sensors required on a large grid necessitate the automated monitoring capabilities of a SCADA system. Automation not only provides efficiency of operation but also affords efficiency of disruption if cyber security systems can be breached. A series of smaller **grid** **systems** could be better **protected** **individually**, thus vastly increasing cyber security.20 Furthermore, the use of hydrogen as an energy storage medium provides a long-term reservoir of energy, and if the SMR were taken offline for a period, a reversible hydrogen stack could return the stored power in the form of electricity, assuming no damage to the transmission infrastructure.

Provide Expeditionary Capability

The fourth concept underpinning the DEA is the idea that any **investments** in energy production and storage systems should be **applicable** in **expeditionary** **environments** as well as at installations after the strategic systems become mature. The military uses doctrine, organization, training, materiel, leadership, personnel, and facilities (DOTMLPF) to assess organizational systems and the resources required to support those systems. DOD should avoid redundancy of DOTMLPF for separate systems for energy production and delivery in garrison and expeditionary environments. This just represents waste and opportunity cost.

Second, the challenges faced in deployed operations are equally well addressed by the microgrid systems that we advocate. In the wars in Afghanistan and Iraq, powering forward operating bases was one of the most challenging and deadly aspect of the conflicts. Diesel generators and vehicles required constant fueling, which gave the enemy ample opportunity to attack resupply convoys. The Army Environmental Policy Institute calculated that every 39 fuel-resupply missions resulted in a U.S. casualty.21 These are lives that are lost or irreparably changed, and no price tag can be placed on them. Additionally, it has been estimated that the financial cost of delivering fuel to the end user in the operational theater exceeded $400 per gallon.22 Given the personal and fiscal costs that result from current in-theater energy systems, the clear challenge is to develop systems that remove military operations from the “tether of logistics” as much as possible. This would not only save blood and treasure but also enhance operational flexibility of commanders since they would experience more autonomy in deploying forces.

In addition to installation energy systems, SMRs have the potential to act as the centerpiece of deployed energy systems. As DOD better understands the capabilities of mobile reactors, we expect to see the technology migrate further to the tactical level. The Navy is certainly no stranger to small nuclear reactors, as they have been employed in the fleet since the USS Nautilus launched in 1955. Project Pele, conducted by DOD,23 envisions an SMR that can be used at remote operational bases.24 Analysis has shown that SMR technology allows for production units that are small enough to be moved by a heavy truck but are large enough to produce up to 20 megawatts of energy, enough to power an Army division headquarters.25

As discussed, an SMR can be buried underground, making it a hard target in a deployed environment. While SMRs address the need for a forward operating base’s energy, they do not directly address vehicle mobility. However, the electricity from nuclear generation can be used to power electric and hybrid electric vehicles that the U.S. military is already experimenting with.26 As stated, nuclear energy can be used to create hydrogen and other fuels, and higher operating temperatures of SMRs are ideal for producing hydrogen. Because hydrogen is energy-dense, it can extend the operational range of vehicles. In fact, H2 is nearly three times as energy-dense as petroleum diesel, which means less refueling and fewer halts in missions for refueling operations.27 These expanded operational capabilities are simply not available with batteries, which have one-hundredth the energy storage capacity of hydrogen on an equal-weight basis.28 The nuclear-hydrogen synergy could provide all the energy needed for military operations in deployed environments and eliminate the fossil-fuel supply chain altogether.29 We believe a Defense Energy Architecture should unequivocally embrace an SMR-hydrogen system in deployed operations to save lives and resources and increase operational range and flexibility.

DOD Role in Advancing Energy Technology

Both **SMRs** and green hydrogen production can be **considered** emerging **commercial** **technologies**. That is, there are commercial units available, but the **industries** have **not** yet **scaled** to **optimize** production **costs**. The general trend in technologies over time is to become smaller and cheaper as the technology evolves. However, this takes place only if **demand** for the **product** is such that the product is seen as having long-term profitability, and companies have the incentive to invest in research and development that keeps technology moving forward.

The military operates nearly **800** **installations** worldwide.30 If even a **fraction** of these **installations** were to **develop** SMR **capabilities**, it would provide a **clear** **signal** to producers and **investors**. The first SMRs would be much less risky to financiers if they had long-term contracted customers once completed. In fact, the Special Capabilities Office (SCO) within the Office of the Secretary of Defense has already narrowed the selection for the first such SMRs to two commercial designs under Project Pele.31 However, this project cannot be seen as a one-off event if the scale benefits for DOD are to be realized. Project Pele could drive the procurement of the first few units within years and lay out a comprehensive plan for future purchases in the out years. A similar effort to identify promising hydrogen technologies would serve to spur investment and bring down costs for long-term, flexible energy-storage options.

The current moment is favorable for this transition in energy systems. SMR designs are being developed by more than 50 startup companies with private capitalization of greater than $2 billion.32 Instead of paying for the entire technological development cost, the **military** need only pay for the **adaptation** to **military** **standards**. Based on this, the SCO predicts the initial non-Navy military SMR market will be 300 units and the civilian market 1,000 units.33 The Department of Energy (DOE)’s Office of Nuclear Energy is already collaborating with the SCO to move the project forward and coordinate national laboratory efforts. In fact, the coauthor has personally been involved in extensive meetings at Creech Air Force Base, Nevada, to discuss the possibility of “assured energy” being supplied to the base through a prototype SMR as early as 2030.

Similarly, there is **much** **interest** in advancing green hydrogen technology. DOE has launched an initiative called the Hydrogen Shot to reduce the production cost of green hydrogen by 80 percent by 2030.34 Furthermore, the Inflation Reduction Act has announced an investment of up to $8 billion in creating regional hydrogen hubs.35 These programs will stimulate significant private investment as well and help advance the current state of hydrogen technology. DOD can draft off these efforts to ensure that developing hydrogen technologies meet the military specifications of an advanced microgrid system. The earlier the demand signal from the military (vs. DOD hoping for the appropriate solutions to emerge organically), the more likely that customized offerings will be available. DOD can play an important role in providing a market for these emerging technologies.

Conclusion

For the military, energy is the **lifeblood** to maintain **military** **capabilities**. In the event of a large-scale natural disaster or infrastructure attack, the **military** needs to maintain its **own** **systems** to **ensure** **readiness**. For these reasons, **DOD** **needs** to keep advancing **SMR**-based microgrid **systems** with adequate long-term energy storage in the form of hydrogen. For strategic facilities, this would mean that bases control their own destiny without counting on an ever more vulnerable electric grid. With SMR microgrids, **military** **bases** can **isolate** their **power** **supply** from the grid when necessary. In fact, during crises, excess power could be supplied to the civilian sector as it is available.

DOD should **double** **down** on the current efforts of **developing** **microgrids** to increase the resilience of its installations, retain the ability to deploy forces globally when needed, and provide expeditionary power without exposed refueling logistics. The benefits would be multifold. In addition to decreasing vulnerability, DOD adaptation of SMR-based microgrids would allow the military to meet clean energy goals and separate itself from carbon-producing fossil fuels. Increased **DOD** **adaptation** would **drive** **demand**, resulting in greater **competition** and **lower** **prices**. Furthermore, it would serve as a model to civilian energy planners who could observe the positive outcomes and adapt the technology to civilian requirements.

The **military** has already **determined** that **SMR** **microgrids** have **merit**, as evidenced by the maturing of Project Pele. The final solution to base supply of electricity should consider long-term efficiencies to the military of the 21st century. All sources of clean energy integration should be considered on a case-by-case basis to meet the individual needs and priorities of each base mission. Success could drive a successful transition to tactical use of SMR microgrids as well.

The **national** electric **grid** is becoming **vulnerable** because of age and the threat of the SCADA control system being compromised through **cyber** **attacks**, **EMP** **disruptions**, intermittent power **outages**, or **terrorist** **threats**. **Military** electric power supply, both strategic and tactical, **must** **adapt** to this reality and plan for increased future use of microgrids within a generation in the name of mission assurance. **Availability**, **affordability**, and uninterrupted power are the force multiplier **requirements** **governing** the **transition** away from legacy systems toward independent **microgrids**. It is **critical** that a **transition** to a defined Defense Energy Architecture, based on these principles, be developed and **implemented** **soon**.

#### It's quick.

**Renahan ’21** [Timothy Renahan; Lieutenant; 10-14-2021; “Realizing Energy Independence on U.S. Military Bases”; National Defense University Press; https://ndupress.ndu.edu/Media/News/News-Article-View/Article/2808076/realizing-energy-independence-on-us-military-bases/; accessed 03-05-2025] tristan

**SMR technology has reached the level of final testing and is expected to be ready for employment by 2026**.23 SMRs can provide on-demand power for a military base if the local energy grid is compromised. These miniaturized nuclear reactors have a smaller footprint compared with a microreactor and are scalable for any energy requirement.24 Although currently not defined, the cost of producing a SMR could range from 15 percent to 40 percent less than construction of a comparable nuclear plant.25 **SMRs would help the U.S. military increase readiness, reduce its carbon footprint, and lower energy-related waste, while taking up less physical space than other clean energy sources**.26

Military bases also provide an additional level of safety, security, and support. The U.S. military has had nuclear-powered vessels, with nuclear support on bases, and independent nuclear facilities since the 1950s with no incidents. Currently, the Navy has boasted approximately “5,400 reactor years of accident-free operations.”27 The Army even operated a nuclear facility at Fort Belvoir (Virginia), only miles from Washington, DC, from 1957 through 1973 without incident or fanfare.28

Drawbacks and Constraints

The biggest barrier to introducing nuclear power to military bases, besides a potential large initial investment, is the word nuclear. Despite the significant rarity of nuclear accidents, the scope and long-term effects of a “Chernobyl” still frighten the population. A 2019 poll showed that Americans were evenly divided, at 49 percent, over the use of nuclear energy as a clean energy alternative—a significant drop from 2010’s high of 62 percent in favor.29 Current political opposition to nuclear power in some states could also be a concern, especially where carbon or natural gas–based enterprises abound.

The potential for terrorist attack and/or cyber attack to a military base is always a threat. But the sheer lack of nuclear incidents in current Navy and Air Force facilities is a direct indication that physical and cyber security measures are in place and being updated.30 This strong record attests that sound processes are available for transfer within DOD, offering a blueprint for future nuclear additions to facilities. There is the possibility of increased costs to secure and transport nuclear material on the base or to a disposal facility. Current DOD efforts to evaluate nuclear power options should account for those costs in order to inform the overall overhead needed to operate the reactor.

Recommendation

**As energy technologies continue to evolve, now is the time to earmark future defense funding to create energy-independent military bases**. SMRs would be the first commercially available technology that could support the critical energy needs of a military base.31 **Current data indicate that they would be less expensive to implement compared with microreactors or other nuclear options**, although both options present a significant initial cost for purchase and infrastructure. DOD should continue to develop and research renewable energy capabilities (solar, wind, water) but should prioritize a nuclear solution to deliver to military bases energy that is independent of a local grid.

#### Perception is enough.

**Andres ’11** [Richard; Professor of National Security Strategy @ the National War College, Senior Fellow & Energy and Environmental Security Policy Chair @ the Center for Strategic Research at the National Defense University; February; National Defense University; “Small Nuclear Reactors for Military Installations: Capabilities, Costs, and Technological Implications,” https://ndupress.ndu.edu/Portals/68/Documents/stratforum/SF-262.pdf; DOA: 3-3-2025] tristan

Strategically, islanding bases with small reactors has another benefit. One of the **main** **reasons** an **enemy** might be **willing** to **risk** reprisals by **taking** **down** the U.S. **grid** during a period of military hostilities would be to **affect** ongoing military **operations**. **Without** the **lifeline** of **intelligence**, **communication**, and **logistics** provided by U.S. domestic bases, American **military** **operations** would be **compromised** in almost **any** conceivable **contingency**. Making bases more **resilient** to civilian power **outages** would **reduce** the **incentive** for an **opponent** to **attack** the **grid**. An opponent might still attempt to take down the grid for the sake of disrupting civilian systems, but the powerful **incentive** to do so in order to win an ongoing battle or war would be greatly **reduced**.

#### Cyberattacks escalate.

**Tilford ’12** [Robert; Graduate from the US Army Airborne School; July 27; Examiner; “Cyber attackers could shut down the electric grid for the entire east coast,” https://web.archive.org/web/20120812000707/http://www.examiner.com/article/cyber-attackers-could-easily-shut-down-the-electric-grid-for-the-entire-east-coa; DOA: 3-3-2025] tristan

Which means military **command** and **control** **centers** could go **dark**.

**Radar** systems that detect air threats to our country would **shut** **down** completely.

“**Communication** between commanders and their troops would also go **silent**. And many **weapons** systems would be left **without** either **fuel** or **electric** **power**”, said Senator Grassley.

“So in a few short hours or days, the **mightiest** **military** in the world would be left **scrambling** to **maintain** base **functions**”, he said.

We contacted the **Pentagon** and officials **confirmed** the **threat** of a cyber attack is something very **real**.

Top national security officials—including the Chairman of the Joint Chiefs, the Director of the National Security Agency, the Secretary of Defense, and the CIA Director— have said, “preventing a cyber-attack and improving the nation’s electric grids is among the most urgent priorities of our country” (source: Congressional Record).

So how serious is the Pentagon taking all this?

Enough to start, or end a war over it, for sure (see video: Pentagon declares war on cyber attacks http://www.youtube.com/watch?v=\_kVQrp\_D0kY&feature=relmfu).

A **cyber**-**attack** today against the US could very well be **seen** as an “**Act** of **War**” and could be **met** with a “full scale” US **military** **response**.

That could **include** the use of “**nuclear** **weapons**”, if authorized by the President.

### 1AC---Adv---Transition

#### Transition is inevitable, but speed is key.

**Joselow ’23** [Maxine; Reporter @ the Washington Post; October 24; Washington Post; “The clean-energy transition is ‘unstoppable,’ IEA says,” https://www.washingtonpost.com/politics/2023/10/24/clean-energy-transition-is-unstoppable-iea-says/; DOA: 3-24-2025] tristan

The clean-energy transition may be inevitable, but may not happen fast enough, IEA says

Ten times as many electric vehicles on the roads worldwide. Solar panels generating more electricity than the entire U.S. power system. Electric heat pumps outselling fossil fuel boilers globally.

These climate-friendly scenarios might sound like a pipe dream, but they are likely to materialize within the next decade, as humanity rapidly shifts to renewable energy to avert the worst impacts of global warming, the world’s leading energy agency said today.

The flagship annual report from the International Energy Agency, dubbed the World Energy Outlook, offers a rosy prediction of the growth of clean-energy technologies around the world. It portrays the decline of fossil fuels, the main driver of rising global temperatures, as all but inevitable.

“The transition to clean energy is happening worldwide and it’s unstoppable,” IEA executive director Fatih Birol said in a statement. “It’s not a question of ‘if’, it’s just a matter of ‘how soon’ — and the sooner the better for all of us.”

The findings come despite steep challenges facing the energy sector, including wars in Ukraine and Gaza that have roiled global oil markets. Paradoxically, they also coincide with decisions by oil giants to double down on fossil fuels for decades to come.

The findings

The IEA envisions green technologies such as solar panels, wind turbines and electric cars taking off in the coming years, thanks to both supportive governmental policies and market forces. By 2030, it predicts:

* Renewables' share of the global electricity mix will approach 50 percent, up from around 30 percent today.
* Three times as much investment will flow to offshore wind projects as to new coal- and gas-fired power plants.
* The share of fossil fuels in the global energy supply will fall to 73 percent, down from about 80 percent today.

Still, demand for fossil fuels will remain too high for humanity to meet the goal of the Paris climate accord: limiting global temperature rise to 1.5 degrees Celsius (2.7 degrees Fahrenheit) above preindustrial levels, the report says. On the supply side, the United States is churning out record amounts of oil.

#### Extinction.

**Nogué ’23** [Sandra; Lecturer in Paleoenvironmental Science @ the University of Southampton; March 23; OUP Academic; “Catastrophic climate change and the collapse of human societies,” https://academic.oup.com/nsr/article/10/6/nwad082/7085016; DOA: 3-24-2025] nikhil recut tristan \*\*brackets r og\*\*

The scientific community has focused the agenda of studies of climate change on lower-end warming and simple risk analyses, because more realistic complex assessments of risk are more difficult, the benchmark of the international targets is the Paris Agreement goal of limiting warming to <2°C, and the culture of climate science is to try to avoid alarmism [1]. Current fires, prolonged droughts, floods and heat waves, together with the consequent food insecurity, civil unrest and migrations, however, are opening the eyes not only of most scientists but also of most people all over the world to the need for considering, at least, the potential catastrophic effects of the collapse of ecosystems and society due to the current emergency of climate change.

The projections for the climate of the coming decades are, as we all know, worrying. The worst-case scenarios in the 2022 Intergovernmental Panel on Climate Change (IPCC) report project temperatures by the next century that last occurred in the Early Eocene, reversing 50 million years of cooler climates within two centuries. The Pliocene and Eocene provide the best analogues for near-future climates [2]. Climates like those of the Pliocene are likely to prevail as soon as 2030 and unmitigated scenarios of emissions of greenhouse gases (GHGs) will produce climates like those of the Eocene for the coming decades. This situation is particularly alarming because human societies are locally adapted to a specific climatic niche with a mean annual temperature of ∼13°C [3]. We can thus logically expect that current and future warming may easily overwhelm societal adaptive capacity.

These climate projections could be even more detrimental if models would not neglect, as they currently do, feedback in the carbon cycle and potential tipping points that could generate higher GHG concentrations [4]. Examples include the apparent slowing of dampening feedbacks such as the natural carbon-sink capacity [5,6], the loss of carbon due to increasing frequencies and intensities of fire at northern latitudes [7], droughts and fires in the Amazon [8] or the thawing of Arctic permafrost that releases methane and CO2 [9]. This feedback is also likely not proportional to warming, as is sometimes assumed. Instead, abrupt and/or irreversible changes may be triggered at a temperature threshold [7]. Particularly worrying is a ‘tipping cascade’ in which multiple tipping elements interact in such a way that tipping one threshold increases the likelihood of tipping another [4,10].

Climate change also interacts with other anthropogenic stressors such as changes in land use, loss of biodiversity, nutrient imbalances, pollution and an overuse of available resources that are crossing the planetary safety boundary limits and operating as a possible catastrophic mix. This mix may exacerbate society vulnerabilities and cause multiple indirect stresses such as economic damage, loss of land and water, and food insecurity that can merge into system-wide synchronous failures. These cascading effects are not only biophysical or biogeochemical, but they also affect human society, generating conflicts, political instability, systemic financial risks, the spread of infectious diseases and the risk of spillover. For example, there is evidence that the 2007−10 drought contributed to the conflict in Syria [11].

Anthropogenic climate change interacting with these other stressors could thus cause a global catastrophe, in a worldwide societal collapse. Kemp et al. [1] have reminded us that although we have reasons to suspect it, such potential collapsing futures are rarely studied and poorly understood. The closest research is the search for evidence of tipping dynamics and estimating thresholds, timescales and impacts of potential tipping points [4]. We advocate for considering them while using the available knowledge acquired from historical and prehistorical examples of local and regional collapses, transformations and resilience of human societies also driven by climate and unsustainable use of resources (Fig. 1).

#### Peak oil guarantees economic collapse---transition solves.

**Ahmed ’23** [Nafeez; PhD, Author, Investigative Journalist, International Security Scholar; March 29; resilience; “America’s Fossil Fuel Economy is Heading for Collapse – It Signals the End of the Oil Age,” https://www.resilience.org/stories/2023-03-29/americas-fossil-fuel-economy-is-heading-for-collapse-it-signals-the-end-of-the-oil-age/; DOA: 3-24-2025] tristan

US oil production is about to peak, but the world is unprepared for the tremendous economic and political consequences. The only path through is energy and economic transformation.

The global economy is currently teetering on the edge of a banking crisis. The IPCC has just released its final major report warning that global carbon emissions need to peak and decline immediately if we are to avoid plunging into dangerous global warming by breaching the 1.5C ‘safe limit’. And in recent weeks and months, industry leaders have announced that the US shale oil and gas revolution is over.

Yet few if anyone is talking about why these things are happening at the same time, and what they really mean.

One of our biggest problems is that we tend to think in silos and sectors. But in the real world, the sectors we assume operate separately are in fact fundamentally interconnected. We ignore and downplay these systemic interconnections at our peril.

The persistence of global inflation has taken many economists by surprise. While they recognise that the impact of Russia’s war in Ukraine on energy and food supplies has been the biggest driver, that silo-ed assumption has led to a failure to understand why inflation is unlikely to simply disappear anytime soon.

We have good reason to believe that the underlying drivers of inflation go beyond just the war in Ukraine. Although it’s extremely difficult to quantify, climate change and environmental degradation is driving inflation by eroding agricultural productivity leading to higher food costs. The impact of extreme weather events is also creating larger and larger damages to infrastructure which in turn is incurring greater costs. As these costs feed into the system, the supply of goods and services becomes more expensive.

Less difficult to quantify is the fact that inflation is historically linked to energy price hikes. And there is mounting evidence that the world is experiencing a major shift in the global fossil fuel system that entails rising costs and diminishing returns, which will end up having a major inflationary effect for far longer and deeper than conventionally assumed.

The end of the shale boom

Since late last year, there have been a growing number of reports pointing out that the US shale revolution is coming to an end. Yet the massive global consequences of this are not being discussed.

“US Shale Boom Shows Signs of Peaking as Big Oil Well Disappear” read one headline in the Wall Street Journal. “The aggressive growth era of US shale is over,” Scott Sheffield, CEO of top independent shale firm Pioneer told the Financial Times. “The shale model definitely is no longer a swing producer.” And according to Bloomberg: “The specter of peak oil that haunted global energy markets during the first decade of the 21st century is once again rearing its head”.

US industry executives are now openly acknowledging that US oil production is likely to peak within the next five or six years, or perhaps in 2030. But there is mounting evidence that the peak will come much earlier, with some industry observers pinpointing its arrival as early as within the next one or two years.

What’s extraordinary about these admissions is how little they are impacting public debate. The implications are seismic. They contradict bullish overinflated forecasts of the industry made two decades ago – in 2005, for instance, Washington DC think-tank RAND Corp was forecasting that the US had enough shale oil to last some 400 years; and in 2012, a senior ExxonMobil executive claimed that the US has “about 100 years of natural gas supply”.

These grand claims were often breathlessly reported as unimpeachable fact by some of the most respected media institutions in the world.

Naysayers (like myself) warning that shale oil and gas would offer at best a temporary boost that was bound to peak and decline in the near-term with major global economic consequences, were dismissed as ‘doomers’.

Now, it turns out, we were right all along.

Mistakes of forecasting

That’s not to say that the traditional ‘peak oilers’ at the time were spot on. They wrongly expected that following the plateauing of conventional oil around 2005, oil prices would rocket up permanently into triple digits as global oil production would go into terminal decline. That didn’t happen. Instead, global demand shifted to the more expensive forms of unconventional oil and gas – especially US shale – which made-up much of the short-fall as conventional oil production slowed down.

But this was a recessionary environment, so global demand was much lower than expected. The massive 2005-2008 global oil price spikes helped induce a banking collapse. After the 2008 financial crash, this meant that there was much less demand for oil – but as oil production projects are planned years in advance pegged to expectations of demand, the oil just kept pumping despite much lower demand due to economic recession.

The result was a glut of shale oil and gas on world markets that allowed oil prices to drop and fuelled widespread belief in a new era of ‘Made in America’ cheap oil.

The US shale boom had a good run, no doubt about it – but its ‘healthy’ lifespan appears to be around two decades. If US shale oil and gas is about to peak and decline in the next few years, what does this mean for the US and global economy?

Coming economic contraction

Given that the US shale revolution played the key role in keeping global oil prices down and lubricating the energy requirements of continued economic activity, the retraction of the US shale revolution will have massive economic impacts.

US production has accounted for around 70% of the total increase in global oil capacity since 2019, and 75% of growth in liquified gas supplies. So as US shale oil and gas peaks, plateaus and declines, global oil and gas production will do so too very shortly after.

Gulf oil and gas producers, however, will not be able to step-in to fill the shortfall. US oil production is currently averaging around 11 million barrels per day (mbd).

A 2022 analysis of production data among the Organisation of Petroleum Exporting Countries (OPEC) which include the biggest powerhouses such as Saudi Arabia and the UAE, suggests that the maximum OPEC could collectively increase production is around 4.5 mbd – that is, less than half of current US shale production.

It’s also not clear how long OPEC can deploy spare capacity to maintain maximum levels of production. This suggests that OPEC will not be able to meaningfully fill the supply gap as US shale declines, which is a clear indicator that total global oil production will eventually begin to peak and decline.

In 2017, I assessed these trends in Failing States, Collapsing Systems. I predicted that US oil and gas production would probably peak and plateau around 2025, and that major Middle East producers would peak and plateau around the 2030s. This scenario now appears to be unfolding before our eyes. Yet no one is talking about it.

The near-term economic and financial consequences will be devastating, and they could lead to permanent long-term consequences without significant transformative action. The impact on the US economy will be profound.

Shale production accounted for 10% of GDP growth in the United States from 2010-2015, which means that the next decade of shale’s plateauing and decline will gradually wipe this out. This will be experienced as a protracted inflationary economic crisis which, in turn, will contribute to volatility in global financial markets. Pundits will likely fail to understand these systemic interlinkages, focusing instead on failing banks, financial institutions and debt, without understanding its energetic triggers.

All this implies that we are sleepwalking into a global energy crisis that will, without accelerating the clean transformation of the energy system, create severe economic and financial consequences by undercutting the fundamental energetic basis of global economic flows. This will compound accumulated vulnerabilities in the banking system linked to unsustainable forms of debt.

The reverberations and bailouts seen in the cases of the Silicon Valley Bank, Credit Suisse and others are merely the opening cracks, that will become widening fissures in the absence of root-and-branch economic restructuring linked to the rapid development of a new energy system.

While that new system is still emerging, it is perhaps unavoidable that we will hit a number of bottlenecks. The danger is that instead of using these bottlenecks to restructure and adapt positively, we may end up regressing, with a loss of capital and energy that forestalls the full potential of transformation.

The window for action is extremely short: we need to act within this decade. Along the way, we need to be aware of the major trends which are likely to emerge as a result of the end of the US shale boom:

1. The illusion of cheap oil is evaporating

While we may still see fluctuating prices, it is becoming clearer that the glut of cheap oil this last decade was not a permanent feature of the energy system, but a temporary symptom of highly specific circumstances as the energy system moves deeper into a state of increasing inputs and diminishing returns. The immediate impact of the peak and plateau of US shale will be sustained high oil prices.

2. The near-term beneficiaries of this will be Gulf oil and gas producers

They currently appear to be the only fossil fuel energy suppliers with sufficient capacity to maintain production. They will therefore not only begin to dominate market share, they will also of course continue to reap higher profits from this more advantageous market position amidst high oil prices.

3. Some capital will move into OPEC for safety, but this is a mirage

Just as this last decade created the illusion of fossil fuel abundance due to the US shale boom, we may see that OPEC’s near-term ability to ramp up spare capacity as shale production declines perpetuates this illusion. We can expect to see lots of bullish statements from Gulf oil producers vindicating grand plans to expand their oil and gas production. Capital will move rapidly into OPEC countries, seen as a last safe space for investors looking for stability and growth. However, OPEC producers will also begin experiencing their twilight very shortly after the decline of US shale, which means that investors will begin to make serious losses as a result far sooner than they imagine.

4. Oil prices will fluctuate within a higher range as US shale peaks

While we can expect significant oil price volatility due to the recessionary impact of high oil prices which would lower demand and therefore allow prices to drop, as we move further into the era of plateau and decline across US and OPEC production, the overall decline in supply is likely to lead oil price fluctuations to narrow within a far higher range which will become a ‘new normal’ as long as oil demand remains high. This may also incentivise near-term conviction in the idea that new oil and gas investments are economical. That would be a colossal mistake, though, as we will see below due to coming reductions in oil demand in the latter half of this decade that will ameliorate high prices and make fossil fuel enterprises increasingly unprofitable.

5. We can expect heightened political polarisation

Incumbent industry ideology will likely blind many energy actors from recognising the writing on the wall – which explains the regressive self-defeating actions of the Biden administration in committing to Arctic drilling. This is like betting on the losing horse after being told it’s about to be overtaken by cars. It illustrates the power of America’s oil lobbies in their last ditch desperate attempt to stay alive on the back of taxpayer subsidies – flying in the face of hard economic realities (a few years ago I broke the story of the British military study which concluded that Arctic drilling was pointless for economic reasons because the costs are so high and returns so low as to make it commercially infeasible). That in turn suggests the political battleground between fossil fuel lobbies and clean energy advocates will become more fraught as the incumbency seeks to double-down in demanding more government subsidies. Millions of jobs will be at risk as the US shale industry declines, and this could create further negative economic and cultural consequences as the US returns to net import status.

6. Clean energy transformation will be critical to stabilise the global economy and restore prosperity

The only viable pathway through this crisis will be to accelerate the clean energy transformation focused on the deployment of exponentially improving technologies which are already scaling because they are cost-competitive with fossil fuels – namely, solar, wind and batteries. This will lay the groundwork for other potential applications such as e-fuels or green ammonia from green hydrogen. This transformation is already underway, and provides the opportunity for the US and others to produce larger quantities of energy at a fraction of the costs of fossil fuels. In Rethinking Climate Change, a RethinkX report for which I was contributing editor, we found that even in the absence of appropriate policy-decisions and major institutional barriers, economic factors will inevitably drive incumbent industries to collapse by 2040 as they are replaced by new solar, wind and battery systems. Unfortunately, while this is far faster than conventional analysts acknowledge, this is not fast enough to avoid dangerous climate change.

#### Decline causes great power war.

**Brands ’21** [Hal; Henry A. Kissinger Professor @ John Hopkins University, Senior Fellow @ the American Enterprise Institute; 9-24-21; Foreign Policy; "China Is a Declining Power—and That’s the Problem," https://foreignpolicy.com/2021/09/24/china-great-power-united-states/; accessed: 12-17-2024] tristan

Slowinggrowth makes it harder for leaders to keep the publichappy. Economicunderperformanceweakens the country against its rivals. Fearingupheaval**,** leaders crackdown 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 beatingback foreign threats.

Manycountries have followed this path. When the United States’ long post-Civil War economic surge ended, Washington violently suppressedstrikes 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 crackeddown 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 invadedtwo 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 anxiousaggrandizement after the end of its postwar economicexpansion 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 militaryinterventions 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.

#### 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**.

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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.

#### Affirming solves:

#### 1. POLITICAL SUPPORT.

**Musaddique ’25** [Shafi; Contributor @ CNBC; February 6; CNBC; “Trump to help spark a nuclear energy ‘renaissance,’ investor says,” https://www.cnbc.com/2025/02/06/trump-to-help-nuclear-energy-renaissance-tema-etfs-khodjamirian.html; accessed: 3-1-2025] tristan

Nuclearenergy is set for a “renaissance” that will be accelerated by backing from U.S. President Donald Trump’s administration.

That’s according to Yuri Khodjamirian, chief information officer at Tema ETFs, who noted that the Trump administration is “very, very interested in backing this technology.′ However, he also warned investors that developing this energy source is “going to take time.”

New nuclear technology approvals take “10 years to get done,” Khodjamirian said, but added that the nuclear re-emergence will likely be accelerated under the new Trump administration.

Speaking to CNBC’s Silvia Amaro on Tuesday’s “Squawk Box Europe,” Khodjamirian said his investment fund has its eyes on firms with a history of developing nuclear technology, such as U.S.-based BWX Technologies, which builds nuclear reactors for military carriers and submarines.

Khodjamirian said Tema is being “very selective in a new technology called small scale modular reactors.”

Small scale modular reactors (SMRs) are advanced nuclear reactors with the ability to provide around one-third of the generating capacity of traditional nuclear power reactors, according to the International Atomic Energy Agency.

SMRs take up less physical space compared to conventional reactors and produce a large amount of low-carbon electricity.

“There’s a lot of excitement there, and equally, a lot of loss-making companies that have unproven technologies, and we’re going for companies that have projects that are approved,” Khodjamirian said.

The nuclear energy renaissance is partly driven by a wave of people that are “realizing that it’s a stable, clean source of energy,” the chief investment officer said, adding that he believes that “there is a need for extra investment” in nuclear, alongside green energy sources that are variable in their electricity production.

“Renewables are good. They can be put up to speed quickly, but they require battery storage,” he said.

Trump has moved quickly on his energy agenda since his return to the White House. The U.S. Senate on Monday confirmed Chris Wright, a fracking executive and a Trump ally, as energy secretary.

Wright is a known nuclear energy supporter, having previously served on the board of advanced reactor company Oklo, as well as having held the position of chief executive at Liberty Energy. The energy firm has since appointed a new CEO following Wright’s confirmation as U.S. secretary of energy.

In 2023, Wright signed a letter supporting nuclear energy.

#### 2. COST & SCALE. The renewable transition is too slow.

**Stein ’22** [Adam; Director of the Nuclear Energy Innovation program @ the Breakthrough Institute, Contributed to many high-profile projects, PhD & MS in Engineering & Public Policy from Carnegie Mellon University; July 6; Breakthrough Institute; “Advancing Nuclear Energy,” https://thebreakthrough.org/articles/advancing-nuclear-energy-report; DOA: 3-24-2025] tristan

The Biden Administration has sought to restore America’s leadership in the global fight against climate change by investing in clean energy. The results illuminate the potential contribution of advanced nuclear power to meeting the Biden Administration’s climate goals.

Upon taking office, President Biden rejoined the Paris Agreement, which seeks to limit the average global temperature rise by 2100 to 1.5 to 2 degrees Celsius above pre-industrial levels. Research published by the Intergovernmental Panel on Climate Change suggests that an unprecedented increase in global nuclear generation may be required, with global nuclear generation increasing to up to 500 percent of current levels across modeled scenarios, to reach ambitious climate targets like 1.5 C at low cost. President Biden has also announced a policy goal of reaching 100% clean electricity in the United States by 2035. Nuclear already accounts for 48 percent of clean electricity generation in the United States at present, and provides a valuable firm source of power to complement the increasing share of variable renewables on the grid. Meeting the administration’s ambitious climate and energy targets will require continued existing nuclear power plant operation, as well as advanced nuclear reactor deployment.

The modeling results, produced with Vibrant Clean Energy, suggest that commercializing advanced nuclear technology could result in rapid growth of clean nuclear generation that would help to meet the administration’s climate goals. The contribution of advanced nuclear to the United States electricity sector in 2050 across the scenarios is summarized in Table 7-1.

In the optimistic Low-Cost High-Learning scenario, the least-cost pathway to meeting a 2050 net-zero power sector target in the United States would have nuclear power provide approximately 50 percent of the entire US electricity demand, up from 19 percent today.

The majority of this nuclear generation would come from advanced reactors, with the deployment of 469 GWe of advanced nuclear power by 2050. Nuclear energy is able to provide this high share of generation with only 21 percent of the capacity in the electricity system, due to the high capacity factors of nuclear plants relative to other clean sources. Additionally, this growth comes in spite of a steady decline in generation from existing traditional nuclear plants, which declines by 80 percent by 2050 in the Low-Cost High-Learning scenario.

The results illustrate the potential importance of advanced nuclear power relative to solar and wind. In the Low-Cost High-Learning scenario, nuclear generation exceeds solar generation by 75 percent and exceeds wind generation by 50 percent in 2050. This suggests that the market size for advanced reactors could substantially exceed the projected large markets for solar and wind power in the course of achieving a future low-cost net-zero power sector. However, finance and policy support would be necessary to achieve the low costs and high learning rates implied by this optimistic scenario.

#### 3. JOBS. Creation is instantaneous.

**Watson ’22** [Nicholas Watson; IAEA Department of Nuclear Energy; Lucy Ashton; IAEA Department of Nuclear Energy; 04-14-2022; "Towards a Just Energy Transition: Nuclear Power Boasts Best Paid Jobs in Clean Energy Sector"; International Atomic Energy Agency; https://www.iaea.org/newscenter/news/towards-a-just-energy-transition-nuclear-power-boasts-best-paid-jobs-in-clean-energy-sector; accessed 02-25-2025] leon

The move to clean energy will generate more jobs than are lost with the transition away from fossil fuels and the highest paid ones will continue to be in nuclear power, which provides significant and sustainable employment benefiting local and regional economies, according to new research presented at an IAEA event.

With more than 130 countries either committing to or considering a target of net zero greenhouse gas emissions by 2050, preparing for how this energy transition will affect the job market is critical. Representatives from the clean energy industry joined a recent IAEA webinar on how rising living standards and job creation can be ensured as energy investments align to meet climate goals.

“Moving away from the use of fossil fuels must not leave anyone behind – this is the concept of a Just Transition,” Henri Paillere, Head of the IAEA Planning and Economic Studies Section, said at the webinar on “Investing in Low Carbon Technologies: Job Creation for Just Energy Transitions”. “Investing in all clean technologies is needed on a massive scale and this must be done in way that creates jobs, economic growth and supports sustainable development.”

Investments in clean energy sources such as solar, wind and nuclear have a positive impact on gross domestic product (GDP) that is two to seven times stronger than spending on fossil sources such as gas, coal and oil, according to an International Monetary Fund working paper. Analysis presented at the webinar by the International Renewable Energy Agency (IRENA) predicts that in a scenario where the global temperature rise is limited to 1.5° Celsius, consistent with global climate goals, jobs in the renewables sector could grow from 12 million to 38 million by 2030.

Other energy transition-related jobs – such as energy efficiency, power grids, energy system flexibility – could grow from 16 million to 74 million over the same period, said Michael Renner, Programme Officer in the Knowledge, Policy and Finance Centre at IRENA. By contrast, conventional energy jobs would decline from 39 million to 27 million.

“Clearly the raw numbers alone look quite good,” Renner said. “The transition-related jobs outweigh the job losses in fossil fuels.”

According to the IMF paper, investments in nuclear power produce the biggest economic multiplier effect of any clean energy source. Nuclear power creates about 25% more employment per unit of electricity than wind power, while workers in the nuclear industry earn one third more than those in the renewables sector, the paper showed.

Similar findings were presented by Philippe Costes, Senior Advisor at the World Nuclear Association (WNA). “Nuclear offers jobs with higher wages than any other energy technology, roughly 25-30% higher. But importantly, while nuclear provides jobs locally around the plant and in regional economies during construction similar to wind, during operation only nuclear provides significant and sustainable jobs to the local and regional economies,” Costes said at the webinar.

#### Otherwise, recession is inevitable.

**Carbonaro ’25** [Giulia Carbonaro; Newsweek reporter based in London with a focus on US and European politics, global affairs, and housing; 01-29-2025; "US Recession Warning Issued by Economist Who Predicted 2008 Financial Crisis"; Newsweek; https://www.newsweek.com/us-recession-warning-issued-economist-who-predicted-2008-financial-crisis-2022587; accessed 02-25-2025] leon

A mismatch between what the U.S. economy has been producing and what it now demands could lead the country into a recession by mid-2025, John P. Hussman, an economist who correctly predicted the 2000 and 2008 stock-market bubbles, has warned.

"Nobody should be surprised if the U.S. economy is in recession by mid-year," he wrote on X, formerly Twitter, on Tuesday.

Why It Matters

For two years in a row now, economists have been wary of the U.S. economy sliding into a recession. While many feared a downturn in both 2023 and 2024, the country's real GDP—which measures the nation's growth—kept beating economists' expectations.

Despite the resilience of the U.S. economy in the post-pandemic years, the chance of a recession hitting the country hasn't been completely staved off.

What To Know

According to Hussman, recessions have occurred historically, "when a mismatch emerges between what the economy has been producing and what the economy now demands," as he wrote in a comment in December, which he shared again on X on Tuesday, adding, "welcome to that mismatch."

The mismatches which lead to a recession, "can be driven by shifts in consumer preferences, interest-sensitive investment, technology, government spending, credit strains, or crises like the pandemic," Hussman wrote on X.

"Disruptions triggered by these mismatches take time to resolve, absent massive bailouts and deficit spending," Hussman said. "My impression is that we may experience more than a bit of a mismatch and disruption in the next few years."

While the U.S. economy still shows "some surface resilience in various measures," Hussman said last month, the country's "structural" GDP growth (demographic labor force growth plus productivity growth) is still estimated at "just 2 percent annually" and some leading measures of economic activity are showing signs of deterioration.

Last month, Hussman mentioned a decline in civilian employment growth, which had already gone negative on a year-over-year basis then.

Civilian employment is expected to shrink dramatically under Donald Trump's presidency. In his first week in office, the Republican president signed an executive order freezing hiring for federal agencies for 90 days, and on Tuesday, his administration offered roughly 2 million federal workers the option to resign now but be paid until the end of September.

#### Tech spills over.

**Brook ’11** [Barry; Australian Laureate Professor & Chair of Environmental Sustainability @ the University of Tasmania, Former ARC Future Fellow @ the University of. Adelaide, Former Director of Climate Science @ the Environment Institute; February 2; BraveNewClimate; “Advanced nuclear power systems to mitigate climate change (Part III),” https://bravenewclimate.com/2011/02/24/advanced-nuclear-power-systems-to-mitigate-climate-change/; DOA: 3-24-2025] tristan

There are many compelling reasons to pursue the rapid demonstration of a full-scale IFR, as a lead-in to a subsequent global deployment of this technology within a relatively short time frame. Certainly the urgency of climate change can be a potent tool in winning over environmentalists to this idea. Yet political expediency—due to widespread skepticism of anthropogenic causes for climate change—suggests that the arguments for rolling out IFRs can be effectively tailored to their audience. Energy security—especially with favorable economics—is a primary interest of every nation. The impressive safety features of new nuclear power plant designs should encourage a rapid uptick in construction without concern for the spent fuel they will produce, for all of it will quickly be used up once IFRs begin to be deployed. It is certainly manageable until that time. Burying spent fuel in non-retrievable geologic depositories should be avoided, since it represents a valuable clean energy resource that can last for centuries even if used on a grand scale.

Many countries are now beginning to pursue fast reactor technology without the cooperation of the United States, laboriously (and expensively) re-learning the lessons of what does and doesn’t work. If this continues, we will see a variety of different fast reactor designs, some of which will be less safe than others. Why are we forcing other nations to reinvent the wheel? Since the USA invested years of effort and billions of dollars to develop what is arguably the world’s safest and most efficient fast reactor system in the IFR, and since several nations have asked us to share this technology with them (Russia, China, South Korea, Japan, India), there is a golden opportunity here to develop a common goal—a standardized design, and a framework for international control of fast reactor technology and the fissile material that fuels them. This opportunity should be a top priority in the coming decade, if we are serious about replacing fossil fuels worldwide with sufficient pace to effectively mitigate climate change and other environmental and geopolitical crises of the 21st century.

#### New reactors are fast.

**Rehm ’23** [Thomas; Ph.D. in chemical engineering from Northwestern University; March; Science Direct; “Advanced nuclear energy: the safest and most renewable clean energy,” https://www.sciencedirect.com/science/article/pii/S2211339822000880; DOA: 3-4-2025] tristan \*\*brackets r og\*\*

Although legacy nuclear energy has been the safest form of electricity generation, it has been demonized as unsafe since the 1960s. The three well-known nuclear accidents, Three Mile Island, Chernobyl, and Fukushima, were legacy nuclear designs. Even with the best safety record of all types of electricity generation, it is time to move away from legacy nuclear to reap the benefits of a truly renewable source of safe clean energy, advanced nuclear. Solar and wind cannot hold a renewable candle to the vast renewable potential of advanced nuclear energy. The transition to carbon-neutral energy can best be made with advanced nuclear, in safety, waste minimization, true renewability for thousands of years, process heat for manufacturing, and a viable means of replacing our chemical manufacturing dependence on fossil fuels. Some of my colleagues tell me, “There are few opportunities for chemical engineers in nuclear”. I disagree. Opportunities include design and operation of high-temperature (550–750 °C) plants involving molten salts, liquid metal, and helium; application of this high-temperature capability for industrial process heating; recycling legacy nuclear ‘waste’ to provide fuel for advanced reactors; integration of the hydrogen economy into nuclear plant design and operation; improvement in moving pebble-bed advanced reactor technology; mining improvements for uranium and thorium, including mining uranium from seawater; molten salt storage systems for improving load following functionality and to provide process heat functionality; resolving corrosion challenges in molten salt reactors; and retrofitting existing oil-and-gas-based refineries to operate as nuclear biorefineries.

Introduction

Renewables are considered by many to be the solution to global warming. Yes, they can contribute. However, without advanced nuclear energy, we will not solve global warming.

Nuclear energy is much safer than solar and wind renewables and has a lower life cycle carbon footprint. The disadvantage of nuclear is its long-lived nuclear waste. To decay to a nominal background level, legacy spent-nuclear fuel requires tens of thousands of years. This paper argues for advanced nuclear, whose much smaller amount of nuclear waste (about 1% of legacy) will decay to background levels in about 400 years [1].

## 2AC

### 2AC---AT: RWT

#### 1. Terrorists can’t do anything with uranium or waste.

**Calma ’24** [Justine; Senior Science Reporter @ the Verge; July 20 Verge; “High hopes and security fears for next-gen nuclear reactors,” https://www.theverge.com/24201610/next-generation-nuclear-energy-reactors-security-weapons-proliferation-risk; DOA: 3-23-2025] tristan \*\*brackets r og\*\*

That 20 percent threshold goes back to the 1970s, and bad actors ostensibly have more information and computational tools at their disposal to develop weapons, Kemp and his coauthors write in the paper. It might even be possible to **craft** a **bomb** with HALEU well under the 20 percent threshold, the paper contends.

Fortunately, that would still be **incredibly** **difficult** to do. “This is **not** **minor** **theft**,” says Charles Forsberg, a principal research scientist at MIT and previously a corporate fellow at Oak Ridge National Laboratory. A group might have to **steal** a couple **years’** worth of **fuel** from a small advanced **reactor** to **make** the kind of **bomb** described in the paper, he says.

Even with a working weapons design, he says it would take a **sophisticated** **team** of at least **several** **hundred** people to go through all of the steps to **turn** that **fuel** into **uranium** **metal** for a **viable** **weapon**. “Unless they’re a whole lot better than I am, and the colleagues I work with, a subnational group [like a **terrorist** **group**] **doesn’t** have a **chance**,” he tells The Verge.

#### 2. Security reforms are coming.

**DOE ‘25** [US Department of Energy, 3-24-2025, $900 Million Available to Unlock Commercial Deployment of American-Made Small Modular Reactors, US Department of Energy, energy.gov/ne/articles/900-million-available-unlock-commercial-deployment-american-made-small-modular-reactors] AZ

WASHINGTON, D.C. – The U.S. Department of Energy (DOE) today re-issued a **$900 million solicitation** to support the **deployment of small modular reactors** to better align with President Trump's bold agenda to unleash American energy and AI dominance.

“**America’s nuclear energy renaissance starts *now***,” said U.S. Secretary of Energy Chris Wright. “Abundant and affordable energy is key to our nation’s economic prosperity and security. This solicitation is a call to action for early movers seeking to put more energy on the grid through the deployment of advanced light-water small modular reactors.”

U.S. electricity demand is forecast to soar in the coming years driven by consumer needs, data center growth, increased AI use, and the industrial sector’s need for constant power.

Small modular reactors could provide reliable power for these energy-intensive sectors, with the added benefit of flexible deployment thanks to their compact size and modular design. Light-water small modular reactors could also leverage the existing service and supply chain supporting the country’s current fleet of light-water reactors, helping speed up the near-term deployment of new nuclear reactors.

DOE is offering funding to de-risk the deployment of Generation III+ light-water small modular reactors (Gen III+ SMR) through two tiers:

Tier 1: First Mover Team Support will provide up to $800M to support up to two first mover teams of utility, reactor vendor, constructor, and end-users/off-takers committed to deploying a first plant while facilitating a multi-reactor, Gen III+ SMR orderbook and the opportunity to work with the **National Nuclear Security Administration** to **incorporate safeguards and security** by design into the projects.

Tier 2: Fast Follower Deployment Support will provide approximately $100M to spur additional Gen III+ SMR deployments by **addressing key gaps** that have hindered the domestic nuclear industry in areas such as design, licensing, supply chain, and site preparation.

#### 4. There are too many barriers.

**Shellenberger ’18** [Michael; Contributor @ Forbes, Best-Selling Author, Endowed Professor @ the University of Austin, serving as CBR Chair of Politics, Censorship, and Free Speech; June 19; Forbes; “Stop Letting Your Ridiculous Fears Of Nuclear Waste Kill The Planet,” https://www.forbes.com/sites/michaelshellenberger/2018/06/19/stop-letting-your-ridiculous-fears-of-nuclear-waste-kill-the-planet/; DOA: 3-27-2025] tristan \*\*ellipses r og\*\*

To appreciate just how ridiculous the latter idea is, imagine, for a moment, that you are an elite terrorist commando like the kind depicted in “Mission Impossible” or a James Bond flick.

First, you must break into a nuclear plant, which is guarded by heavily armed security guards who are often — at least in the U.S. — former special forces officers. Next, you must kill, incarcerate, or otherwise incapacitate the 700 to 1,000 people who work at the plant.

After that you’re going to need to quickly hoist a can of old nuclear fuel onto the back of a truck. It can’t be a pick-up truck, which would be crushed under its weight. It will have to be an industrial-sized truck capable of hauling over 100 tons.

Next, you have to escape. This will require driving for hours on freeways while escaping law enforcement officers who will inevitably be scrambled in response to your plant invasion.

But all of that’s just the beginning. In order to turn the nuclear waste into a nuclear bomb, you’ll need to reprocess it in a highly specialized facility, preferably underground, so as to not be detected. Inside your mountain lair, which you spent months constructing without anyone noticing, you'll use a crane to pull the heavy metal rods out of the cans and reprocess them for so long that…

Well, at this point, even Michael Bay would say the scenario was too unrealistic.

What about a “dirty bomb”? Couldn’t a terrorist break into the plant and pull some nuclear waste out of a can and attach it to a homemade explosive?

But why would any terrorist do this? Any terrorist who wants to make a dirty bomb could just break into the local hospital where radioactive waste (from x-rays and other medical devices) is available at far lower levels of security.

### 2AC---AT: Oil

#### That’s why

**Scharf ’25** [Avi; April 2; Haaretz; “Record-breaking U.S. deployment in Middle East amid Trump's nuclear ultimatum for Iran,” https://www.haaretz.com/israel-news/security-aviation/2025-04-02/ty-article/record-breaking-u-s-deployment-in-middle-east-amid-trumps-nuclear-ultimatum-for-iran/00000195-f5a6-d470-addd-f5ee0fd70000; DOA: 4-5-2025] tristan

These technological solutions have allowed producers to increase production rates for rigs as they drill new wells. Improved performance is particularly evident in the Permian region, where we observed a 9% year-over-year increase in November’s crude oil productivity per active rig.

The U.S. military has carried out its largest offensive deployment to the Middle East since the Israel-Hamas war began in October 2023, according to a Haaretz analysis of open-source aviation data.

In recent weeks, Washington has sent squadrons of fighter jets, stealth bombers and large quantities of weaponry to the region – amid its ongoing campaign in Yemen and ahead of the ultimatum issued by President Donald Trump to Iran over its nuclear program.

At least 140 heavy transport aircraft landed in Qatar, Bahrain, the United Arab Emirates, Saudi Arabia, Kuwait and Jordan during the month of March, originating from several key U.S. military bases. Most were loaded with equipment, according to data transmitted mid-flight.

Since the outbreak of Israel's war with Hamas and Hezbollah, the United States has deployed significant forces to the region and launched an airlift of weapons and equipment to Israel – particularly during the war's first weeks, and around the two major Iranian missile attacks on Israel last April and October.

This new buildup, first reported by Haaretz last week, marks a roughly 50 percent increase over the previous monthly peak in U.S. military flights to the region.

#### 3. Trump already beginning plans to withdraw from the Middle East. Kube-25:

Courtney Kube is a correspondent covering national security and the military for the NBC News Investigative Unit. “Defense Department drafting plans to withdraw all U.S. troops from Syria after recent Trump comments” 2/5/25 NBC News [https://www.nbcnews.com/politics/national-security/dod-drafting-plans-withdraw-us-troops-syria-recent-trump-comments-rcna190726 DOA 4/5/24](https://www.nbcnews.com/politics/national-security/dod-drafting-plans-withdraw-us-troops-syria-recent-trump-comments-rcna190726%20DOA%204/5/24) MB]

The Defense Department is developing plans to withdraw all U.S. troops from Syria, two U.S. defense officials told NBC News on Tuesday. President Donald Trump and officials close to him recently expressed interest in pulling U.S. troops out of Syria, the officials said, leading Pentagon officials to begin drawing up plans for a full withdrawal in 30, 60 or 90 days. Trump’s new national security adviser, Mike Waltz, spent Friday at the headquarters of U.S. Central Command in Tampa, Florida, meeting with senior U.S. military leaders and getting briefings on the Middle East, according to U.S. defense officials. A White House official said the potential reduction of U.S. forces in Syria was not a topic of the briefing or the purpose of Waltz's visit. “It’s good for NSA Waltz to visit CENTCOM to get a sense of the entire region,” the White House official said, pointing out that Israeli Prime Minister Benjamin Netanyahu visited the White House on Tuesday and that Jordan’s King Abdullah is scheduled to visit next week. A Pentagon spokesperson declined to comment. Last Thursday, a reporter asked Trump at an Oval Office media event about reports he had informed the Israeli government about pulling U.S. troops out of Syria. “I don’t know who said that. I mean, I don’t know who said that, but we’ll make a determination on that. We’re not getting, we’re not involved in Syria,” Trump replied. “Syria is its own mess. They got enough messes over there. They don’t need us involved in everyone.” In late 2019, Trump ordered Defense Secretary James Mattis to withdraw all U.S. troops from Syria. Mattis pushed back against the plan and ultimately resigned in protest. Trump withdrew most U.S. troops but subsequently moved them back. The U.S. presence in Syria has continued since then. In December, the Pentagon announced that roughly 2,000 troops were deployed to Syria, more than double the number the military had said for years, about 900. A Pentagon spokesman described the additional 1,100 troops at the time as “temporary rotational forces” for about 30 to 90 days at a time, while the 900 were “core” troops deployed there for closer to one year. **U.S. mission in Syria** The Pentagon says the military mission in Syria is to degrade the Islamic State terrorist group and support local partners operating there. They include the Syrian Democratic Forces, a Kurdish-led coalition of militias and rebel groups, to ensure that ISIS cannot rebuild a safe haven. CENTCOM conducted a precision strike in northwest Syria on Thursday, targeting a leader of Al Qaeda affiliate Hurras al-Din. Defense officials described Muhammad Salah al-Za’bir as a senior operative of Hurras al-Din. Defense officials warn that pulling U.S. troops out of Syria abandons the Syrian Democratic Forces and threatens the security of more than two dozen prisons and refugee camps, housing more than 50,000 people, including roughly 9,000 ISIS fighters. The Syrian Democratic Forces secure the facilities, which hold men, women and children, but they rely on U.S. and allied support and money to keep them operating. Without U.S. troops to support military and detention operations, the Syrian Democratic Forces could prioritize offensive operations and abandon the prisons and camps, freeing thousands of ISIS fighters. Rebel forces known as Hayat Tahrir al-Sham unexpectedly overthrown Bashar al-Assad’s regime in December. HTS, as it is known, is a coalition of Syrian-based Sunni Islamist insurgent groups that emerged from Jabhat al-Nusra, or the Nusra Front, a branch of Al Qaeda that operates in Syria. The leader of HTS, Ahmed al-Sharaa, formerly known as Abu Mohammad al-Jolani, became the de facto leader in Syria after Assad’s regime fell. Al-Sharaa and other HTS representatives met with senior Biden administration officials in late December in the first formal diplomatic meeting between the United States and Syrian officials in more than 10 years. Al-Sharaa has pledged to conduct a political transition that includes an inclusive government and elections, which could take up to four years to hold

#### 4. No Israeli first strike.

Zachary **Keck 15**, 2/09/2015, Wohlstetter Public Affairs Fellow at the Nonproliferation Policy Education Center and researcher at the Belfer Center for Science and International Affairs, 5 Reasons Israel Won't Attack Iran, DOA: 4/02/2023, https://nationalinterest.org/feature/five-reasons-israel-wont-attack-iran-9469)// JZ

Although the interim deal does further reduce Israel’s propensity to attack, the truth is that **the likelihood of an Israeli strike** **on Iran**’s nuclear facilities **has always been greatly exaggerated**. There are at least five reasons why Israel isn’t likely to attack Iran.

1. You Snooze, You Lose

First, **if Israel was going to strike** Iran’s nuclear facilities, **it would have done so a long time ago**. Since getting caught off-guard at the beginning of the Yom Kippur War in 1973, **Israel has generally acted proactively** to thwart security threats. **On no issue has this been truer** **than with nuclear-weapon programs**. For example, **Israel bombed** **Saddam** Hussein’s program **when it consisted of just a single nuclear reactor**. According to ABC News, **Israel struck Syria’s lone nuclear reactor** just months after discovering it. The IAEA had been completely in the dark about the reactor, and took years to confirm the building was in fact housing one.

Contrast this with Israel’s policy toward Iran’s nuclear program. The uranium-enrichment facility in Natanz and the heavy-water reactor at Arak first became public knowledge in 2002. For more than a decade now, **Tel Aviv has watched** as **the program** has **expand**ed **into two fully operational nuclear facilities**, a budding nuclear-research reactor, and countless other well-protected and -dispersed sites. Furthermore, **America’s extreme reluctance to initiate strikes** **on Iran was made clear to Israel** at least as far back as 2008. **It would be completely at odds with how Israel operates for it to standby until the last minute when faced with what it views as an existential threat.**

2. Bombing Iran Makes an Iranian Bomb More Likely

**Much like a U.S. strike**, only with much less tactical impact, **an Israeli air strike** against Iran’s nuclear facilities **would only increase the likelihood that Iran would build the bomb**. At home, Supreme Leader Ali **Khamenei** **could use the attack to justify rescinding his fatwa** against possessing a nuclear-weapons program, while using the greater domestic support for the regime and the nuclear program to mobilize greater resources for the country’s nuclear efforts.

**Israel’s attack would** also **give** **the Iranian regime a legitimate** (in much of the world’s eyes) **reason to withdraw from the** Nuclear Non-Proliferation Treaty (**NPT**) **and kick out** international **inspectors.** If Tehran’s membership didn’t even prevent it from being attacked, how could it justify staying in the regime? Finally, **support for international sanctions will crumble in the aftermath of an Israeli attack, giving Iran more resources with which to rebuild** its nuclear facilities.

3. Helps Iran, Hurts Israel

Relatedly, an Israeli strike on Iran’s nuclear program would be a net gain for Iran and a huge loss for Tel Aviv. **Iran could use the strike to regain its popularity** with the Arab street **and** increase the **pressure against Arab rulers**. As noted above, **it would also lead to international sanctions collapsing**, **and an outpouring of sympathy for Iran** in many countries around the world.

Meanwhile, **a strike** on Iran’s nuclear facilities **would leave Israel in a far worse-off position**. **Were Iran to respond** by attacking U.S. regional assets, **this could greatly hurt Israel’s ties with the U**nited **S**tates **at both the elite and mass levels**. Indeed, **a war-weary American public is adamantly opposed to its own leaders dragging it into another conflict** in the Middle East. Americans would be even more hostile to an ally taking actions that they fully understood would put the U.S. in danger.

Furthermore, **the quiet but growing coop**eration **Israel is enjoying with Sunni Arab nations against Iran would evaporate overnight**. Even though many of the political elites in these countries would secretly support Israel’s action, **their explosive domestic situations would force them to distance themselves from** **Tel Aviv** for an extended period of time. Israel’s reputation would also take a further blow in Europe and Asia, neither of which would soon forgive Tel Aviv.

4. Israel’s Veto Players

**Although Netanyahu may be ready to attack** Iran’s nuclear facilities, **he operates within a democracy** **with a strong elite structure**, particularly in the field of national security. **It seems unlikely that he would have enough elite support for him to seriously consider such a daring and risky operation**.

For one thing, **Israel has strong institutional checks** **on using military force**. As then vice prime minister and current defense minister Moshe Yaalon explained last year: “In the State of Israel, **any** process of a military **operation**, and any military move, **undergoes the approval of the security cabinet** and in certain cases, the full cabinet… the decision is not made by two people, nor three, nor eight.” **It’s far from clear Netanyahu**, a fairly divisive figure in Israeli politics, **could gain this support**. In fact, Menachem **Begin struggled to gain sufficient support for the** 1981 **attack on Iraq** **even though Baghdad presented a more clear** **and** **present danger** to Israel than Iran does today.

What is clearer is that **Netanyahu lacks the support of much of Israel’s highly respected** national **security establishment**. Many former top **intelligence and military officials have spoken out publicly against Netanyahu’s hardline Iran policy**, with at least one of them questioning whether Iran is actually seeking a nuclear weapon. Another former chief of staff of the Israeli Defense Forces told The Independent that, “**It is quite clear that much if not all of the** **IDF** [Israeli Defence Forces] leadership **do not support military action at this point**…. In the past the advice of the head of the IDF and the head of Mossad had led to military action being stopped.”