Introduction:

We negate the United States federal government should substantially increase its investment in domestic nuclear energy.

Contention one is climate change

The US is lagging behind key commitments on nuclear power now, Luongo 24 states

Ken **Luongo**, 9-20-20**24**, (President, Partnership for Global Security) "U.S. Lacks Nuclear Energy Strategy to Achieve COP28 Commitment," Partnership for Global Security, https://partnershipforglobalsecurity.org/u-s-lacks-nuclear-energy-strategy-to-achieve-cop28-commitment/ //LFP

At the Dubai climate change meeting in November 2023, almost two dozen countries agreed to triple the deployment of nuclear energy by 2050. The U.S. supported that commitment, China eventually did, and Russia remained silent. Ten months later, China has approved 11 new reactors, Russia is proposing 34 new units by 2042, and **the U.S. has announced no plans for additional reactor construction**. For the previous period of 2019-2023, China approved "six, four, five, 10, and 10" new reactors in those respective years. Despite the Secretary of Energy calling for the addition of "200 more megawatts by 2050" of n> visiting the newly completed Vogtle plant in May, **the U.S.at the moment is not on track to deploy any new reactors in the foreseeable future**.

American allies that are party to the Dubai declaration, however, are moving forward. South Korea, has approved two new reactors, France and the U.K. are also accelerating new reactor construction. And nations in Central and Eastern Europe are planning to initiate or expand their nuclear energy capacity, including Poland, Bulgaria, the Czech Republic, Romania, and Hungary. Still, since the COP, there have been important victories for the U.S. Poland has chosen the Westinghouse Electric Company to build its first three nuclear power plants, the company's AP-1000 reactors are under construction in China, and it is in competition for reactor contracts in Central and Eastern Europe, as well as potentially the Ukraine and U.K. Westinghouse also is producing VVER reactor fuel to replace reliance on Russia. The U.S. also is supporting its existing domestic reactor fleet, which currently is the largest fleet in the world. This includes the preservation of the slated-to-be-closed Diablo Canyon reactor in California and the resuscitation of the mothballed Palisades nuclear plant in Michigan. There also is discussion of reopening Three Mile Island to power data centers. Further, U.S. is pouring billions into the development and demonstration of next-generation smaller nuclear reactors to serve energy and industrial needs around the world. And it has restarted uranium enrichment to produce HALEU to fuel these reactors. But the country is facing some significant headwinds that are hindering progress. A major change will be the installation of a new government administration in January 2025. There is the real possibility of frozen or uncertain policy direction depending on who is elected. And delays are certain as new top-level personnel are selected and vetted. The Harris nuclear energy policy is not clear. She cast the deciding vote in favor of the Inflation Reduction Act, that included billions of dollars for nuclear energy. But, as a candidate, she has not spoken specifically about the role of nuclear power for energy production or carbon reduction. The Trump nuclear energy policy is clear. The Republican convention platform stated, that he will, "unleash Energy Production from all sources, including nuclear." But the Trump approach to alliance management could impede nuclear construction overseas, and supply chain development at home, particularly in projects where the U.S. and South Korea are interdependent. A dispute that originated during the Trump administration over whether Westinghouse intellectual property resides in the Korean APR-1400 reactor continues to simmer. This, at the very least, is impacting the ability to construct two new Korean reactors in the Czech Republic. The U.S. next-generation reactor initiative also is encountering setbacks in the real world, offsetting the happy talk epitomized by, "pictures of people in business suits shaking hands in front of a camera, flags in the background, and announcements of promises to study deployment." Progress is proceeding with the development of these reactors, commitments are being made dependent on demonstration and licensing, and sites are being cleared for deployment. But there is an undercurrent of concern about the pace of progress and whether these reactors will really be ready by the early 2030s. There are questions about the efficiency of the licensing process and what setbacks will be encountered when new technologies are demonstrated. Then there are questions about what markets and nations are ready to operate these advanced technologies and whether the U.S. can counter the tantalizing technological-financial offerings of Russia and China and build an reactor "order book."

<Not redacted just condensed>

At the root of the challenges facing America's objective of expanding nuclear energy at home and abroad is the lack of a cohesive strategy for how to achieve the goal. Creating this plan is essential for success. No w that the government has handed out its legislative and financial goodies to spark nuclear power advancement, it can't be content to just hand off the hard work of market capture and reactor deployment to the U.S. commercial nuclear industry. That is not a winning plan, and it won't work. The low hanging fruit won't last and prevailing in the tougher markets where countries have financial, governance, or political challenges, requires a strong commercial-government partnership. If the U.S. is really serious about achieving even a small percentage of the nuclear growth proposed in Dubai, and beating out Russia and China while doing it, it is going to need a detailed private-public technology, financing, market, and geopolitical strategy to make it a reality.

New federal investment is key to rebuild a failing nuclear sector Albert 25,

Craig **Albert**, 1-23-20**25**, (President and COO of Bechtel, an American engineering, procurement, construction, and project management company) "Affordability Is Key to Nuclear Power's Big Future", Bechtel Newsroom, https://www.bechtel.com/newsroom/blog/affordability-is-key-to-small-modular-reactors-big-future/, accessed 2-17-2025 //LFP

Ultimately, embracing a growing diversity of reactor technologies is the industry's best hope for creating a thriving sector. Large, **gigawatt-scale reactors have a track record of achieving high performance, significant output, and economies of scale**. When we build them successfully, **it sharpens the industry's expertise and grows the supply chain and workforce for all future reactor deployments**. We're seeing this at Bechtel right now, as we bring lessons learned on large-scale reactor projects to our work on an SMR with TVA. Building a Path to Affordability For that to happen, we must push these technologies down the cost curve by building more units. As with any new technology, once standardization and repetition are achieved, construction schedules shorten, and costs go down. Over time, economies of scale are realized. This is true for every aspect of project delivery including engineering design, permitting, manufacturing, and construction. We had just reached this tipping point in the 1970s before nuclear's decline. Now, we're on track to reach it again over the next 10 to 15 years. But getting there will require a deep commitment from stakeholders to standardize the designs, reduce constructability risk, and accelerate affordability. **That begins with reducing the financial risk for first movers**. Early projects are more likely to encounter unforeseen costs or delays—often deterring would-be nuclear investors. However, **if the U.S. government were to increase its investment** and offer targeted, timebound incentives—**it could provide first movers with the financial security needed to drive the industry forward**. The government could also see significant returns on its investment in the form of tax revenue, job creation, and overall economic growth.

A revitalized nuclear sector is critical to fighting climate change, Blanchard et al. 23 states

Blanchard, O., **Gollier**, C., **& Tirole**, J. (**2023**). The Portfolio of Economic Policies Needed to Fight Climate Change. Annual Review of Economics, 15(1), 689-722. doi: 10.1146/annurev-economics-051520-015113
https://www.annualreviews.org/doi/pdf/10.1146/annurev-economics-051520-015113
//LFP

As a key sector of greenhouse gas emissions and decarbonization, the **production of electricity must be altered in level as well as structure**. There is a growing literature (see, e.g., Cole et al. 2021, MIT Energy Initiat. 2022) that attempts to characterize the least-cost low-carbon electricity mix for the decades to come. These studies share similar conclusions: Although the global consumption of primary energy is expected to go down thanks to sobriety and energy efficiency, much more electricity will need to be produced to match the increased demand associated with EVs, green buildings (heat pumps, for example), or the production of green hydrogen (which uses CO2-free energy to power electrolysis that splits water into hydrogen and oxygen) for mobility and higher-temperature industrial processes. This will create challenges for electricity generation, distribution, and transmission. In terms of structure, most electricity will have to be produced from carbon-free sources. Renewables will need to be widely deployed, but they may still be expensive because of electrical system balance and transmission problems. First, these are intermittent sources of energy and, in the absence of cheap battery or other sources of storage, have to be supplemented by other means of production. Second, in Europe the best wind resources are in the North, especially offshore, while the best solar resources are in the South. Bringing renewable electricity to where consumption takes place poses a challenge for high-voltage transmission grids, for both economic and not-in-my-backyard reasons. Besides the unpopularity of high-voltage transmission lines, there is a second obstacle to the efficient localization of renewables. Developing such lines across Europe requires cooperation among a number of grid owners and dispatchers with divergent interests (the same problem exists in the United States). A long-awaited solution would be to create a single European transmission and dispatching system that would enable a single European electricity market and thus facilitate the deployment of renewables (Wu et al. 2021).46 Due to the high cost of electricity storage, the marginal abatement cost in the electricity sector grows asymptotically to attain zero-net emission. Cole et al. (2021) estimated that switching from 99% to 100% renewable electricity mix in the United States would yield a marginal abatement cost of $930/tCO2. The report of the MIT Energy Initiative (2022) estimates a marginal abatement cost of $644/tCO2 for a 99% reduction of emissions of the Northeastern power grid. These **studies emphasize the key role of a carbon-neutral dispatchable source of electricity, such as the nuclear technology, to attain zero-net emission**. A 2021 report by RTE (Réseau de transport d'électricité, the French grid company) shows that the least-cost zero-net electricity mix for 2050 allocates a sizeable production share to nuclear electricityx (RTE 2021). Regardless of opinions about this mode of production, maintaining safe operation of existing nuclear plants, which for example provided in 2021 three-quarters of the electricity production in France, is a necessary piece of EU contributions to the fight against climate change: **Nuclear is carbon free, is dispatchable, and has high availability**. Large refurbishment operations can, at a reasonable cost, extend the life of these power plants up to 60 years (some even argue 80 years). Should construction of new nuclear power plants, or the choice of a specific nuclear technology (third and fourth generations, including small modular reactors), be privileged? Issues related to the cost and reliability of nuclear plants, the sequencing of the green transition, and the extension of the life span of existing plants should be examined. The literature suggests that the construction of new nuclear plants should not be excluded on a priori grounds, given the expected huge increase in demand for decarbonized electricity. When it comes to investment and R&D, and given technological and societal uncertainties, it is important not to put all our eggs in the same basket.

Climate is an existential risk- try or die to avoid extinction and controls every single impact in the round- mass migrations, warming, resource wars all lead to extinction Lenton et al. 19,

Lenton et al. 2019 (Lenton, T. M., Rockström, J., Gaffney, O., Rahmstorf, S., Richardson, K., Steffen, W., & Schellnhuber, H. J.) (Timothy M. Lenton is director of the Global Systems Institute, University of Exeter, UK. Johan Rockström is director of the Potsdam Institute for Climate Impact Research, Germany. Owen Gaffney is global sustainability analyst, Potsdam Institute for Climate Impact Research, Germany and Stockholm Resilience Centre, Sweden. Stefan Rahmstorf is professor, Potsdam University and co‑ chair of Earth system analysis, Potsdam Institute for Climate Impact Research, Germany. Katherine Richardson is professor, University of Copenhagen, Denmark. Will Steffen is emeritus professor, Australian National University, Australia. Hans‑Joachim Schellnhuber is founding director, Potsdam Institute for Climate Impact Research, Germany) (2019). Climate tipping points—too risky to bet against. Nature, 575(7784), 592-595 //LFP

Politicians, economists and even some natural scientists have tended to treat tipping points ‑ such as the loss of the Amazon rainforest or the West Antarctic ice sheet ‑ as high‑impact, but highly uncertain and low‑probability events. However, scientific evidence is accumulating that Earth system **tipping points may be closer than previously thought, and interconnected across different** biophysical **systems**, potentially **committing the world to long‑term irreversible changes**. Here we summarise evidence on the threat of crossing tipping points, identify knowledge gaps, and suggest how these should be plugged. We explore the impacts of such changes, how quickly they may unfold, and whether we still have any control over them. We argue the consideration of tipping points helps define that we are in a climate emergency and strengthens this year's chorus of calls – from schoolchildren to the world's scientists, cities to countries – for urgent climate action. The Intergovernmental Panel on Climate Change (IPCC) introduced the idea of tipping points two decades ago. These 'large‑scale discontinuities' in the climate system were then considered likely only if global warming exceeded 5°C. Now information summarised in two recent IPCC Special Reports2,3 points to the crossing of tipping points even at 1‑2°C of warming (see: Too close for comfort). Despite the Paris Agreement's goal to limit warming to well below 2 °C, current national pledges to reduce emissions, if implemented, are likely to result in at least 3 °C of global warming. Some economists working with cost‑benefit climate‑economy models have previously suggested 3 °C warming as optimal climate policy. However, such models assume that climate tipping points are high impact, but very low probability events. If instead tipping points already have higher probability, this aligns the 'optimal policy' recommendations of simple cost‑benefit climate‑ economy models4 with the recent IPCC report2 to limiting warming to 1.5°C – **requiring an emergency response**. **Ice tipping** We think that several cryosphere tipping points appear dangerously close, but mitigating greenhouse gas emissions could still slow down the inevitable accumulation of impacts and help us adapt

• Research in the last decade has shown that the Amundsen Sea Embayment of West Antarctica may have passed a tipping point3 – in which the 'grounding line' where ice, ocean and bedrock meet is retreating irreversibly. A model study shows5 that when this sector collapses, it could destabilise the rest of the West Antarctic ice sheet, like toppling dominoes – leading to about 3m of sea-level rise during the coming centuries to millennia. Paleo-evidence shows that such widespread collapse of the West Antarctic ice sheet has occurred repeatedly in past inter-glacial intervals. New data show part of the East Antarctic ice sheet – the Wilkes basin – may be undergoing the same marine ice sheet instability3 . Modelling work suggests that it could add another 3-4m to sea-level on timescales beyond a century. The Greenland ice sheet is melting at an accelerating rate3 and could add a further 7m to sea-level over thousands of years, if it passes a threshold– beyond which, as the ice sheet melts, its elevation lowers, exposing the surface to ever warmer air. Models suggest the Greenland ice sheet could be already be doomed at 1.5°C of warming3 , which could be as soon as 2030. Thus, future generations may already be committed to the order of 10m sea-level rise over thousands of years3 . However, **the timescale over which tipping unfolds** – and sea-level rises **– is still under our control, because the rate of meltdown depends on the magnitude of warming above the tipping point**. At 1.5°C global warming, it could take ten thousand years to unfold3 , but above 2°C the response could take less than a thousand years6 . Only recently a marine ice cliff instability was identified that could further accelerate marine ice sheet loss, but lack of observational constraints make its contribution uncertain. Researchers need more observational data to establish if ice sheet tipping is underway, and improved models constrained by past and present data to resolve how soon and fast the ice sheets could go. Even if ice sheet tipping is underway, there **remains a strong mitigation incentive to slow sea-level rise**, which will **aid adaptation** including eventual resettlement of large low-lying population centres. A further key impetus to limit warming to 1.5°C, is that some tipping points could be triggered earlier at low levels of global warming. Although initially overlooked, the last generation of IPCC models projected a cluster of abrupt shifts7 at 1.5-2°C. Several involve sea-ice, which is already shrinking rapidly in the Arctic such that the region has a 10-35% chance3 of being largely ice free in summer at 2°C. **Biosphere tipping**

<Not redacted just condensed>

Climate change and other human activities risk triggering biosphere tipping points,

across a range of ecosystems and scales (see: Change underway). Ocean heatwaves have led to mass coral bleaching and loss of half of the shallow-water corals on the Great Barrier Reef. A staggering 99% of tropical corals are projected2 to be lost by 2°C, owing to interactions between warming, ocean acidification and pollution. This would represent a profound loss of marine biodiversity and human livelihoods. **In addition to undermining our life-support system, biosphere tipping points can also trigger abrupt carbon release back to the atmosphere**. **This can amplify climate change and abruptly reduce remaining carbon emission budgets to limit warming** to 1.5°C. Deforestation and climate change are destabilizing the Amazon, the world's largest rainforest, and home to one in ten known species. Estimates of where an Amazon tipping point could lie range8 from 40% to just 20% of forest cover loss. About 17% has already been lost since 1970, with the rate of deforestation clearly depending non-linearly on policy actions. To narrow down where the tipping point lies requires models that include deforestation and climate change as interacting drivers and fire and climate feedbacks as interacting tipping mechanisms across scales. With the Arctic warming at least twice as fast as the global average, the boreal forest in the subarctic is vulnerable to tipping. Already warming temperatures have triggered a population explosion of bark beetles and an abrupt increase in fires causing North American boreal forest dieback, with some regions already observed to have switched from a carbon sink to a source . Permafrost across the Arctic is irreversibly thawing and releasing CO2 and methane – a more potent yet shorter-lived greenhouse gas. Researchers need to better understand these observed changes in major ecosystems at 1°C as well as where future tipping points might lie. Existing carbon stores and potential CO2 and methane releases need better quantification. Even without potential biosphere tipping points,the world's remaining emission budget for a 50:50 chance of saying within 1.5°C is only about 500 GtCO2. Permafrost emissions could take an estimated 10-20% (100 GtCO2) off this budget, and this does not consider deep permafrost or undersea methane hydrates. If forest

tipping points are near, Amazon dieback could release11 another 90 GtCO2, and boreal forests a further11 110 GtCO2 . With emissions still >40 GtCO2 yr-1 , the remaining budget could be all but erased already. **Global tipping** In our view, the <Not redacted just condensed>

clearest source of emergency would be if we were approaching **a global tipping point to a** new, less habitable, **'hothouse' climate state** 11. This could happen **if tipping points interact with sufficient strength to trigger a tipping cascade**11. Interactions could happen via ocean and atmosphere circulation or via feedbacks that increase greenhouse gas levels and global temperature. Alternatively, strong cloud feedbacks could cause global tipping12,13. We argue that **cascading effects between tipping elements may be a common feature**. Recent research analysing 30 types of regime shift, spanning the physical climate and ecological systems – from West Antarctic ice sheet collapse to switching from rainforest to savanna – indicated that crossing tipping points in one system can increase the risk of crossing tipping points in other systems.

Such links were found for 45% of possible interactions14. We suggest that specific examples of interacting tipping elements are starting to be observed. For example, Arctic sea-ice loss is amplifying regional warming and Arctic warming and Greenland melting are driving an influx of freshwater into the North Atlantic. This may have contributed to a recent 15% slowdown15 of the Atlantic Meridional Overturning Circulation (AMOC)3 . Rapid melt of the Greenland ice sheet and further slowdown of the AMOC could tip the West African monsoon, triggering drought in the Sahel. AMOC slowdown could also dry the Amazon, disrupt the East Asian monsoon, and cause heat to build-up in the Southern Ocean with potential to accelerate Antarctic ice loss. The paleo-record shows global tipping, such as the entry into ice age cycles 2.6 Ma and their switch in amplitude and frequency around 1 Ma, which models are only just capable of simulating. Sub- global tipping occurred repeatedly within and at the end of the last ice age (the Dansgaard-Oeschger and Heinrich events). Although not directly applicable to the present interglacial, this highlights that the Earth system has been unstable across multiple timescales beforehand, under relatively weak forcing caused by changes in the Earth's orbit. Now we are strongly forcing the system; with atmospheric CO2 concentration and global temperature increasing at rates an order of magnitude faster than during the most recent deglaciation. CO2 is already at levels last seen ~4 Ma in the Pliocene, and rapidly heading towards levels last seen ~50 Ma in the Eocene, when temperatures were up to 14°C higher than preindustrial. It is challenging for climate models to simulate such past 'hothouse' Earth states. One possible explanation is that they have been missing a key tipping point: A recent cloud-resolving model suggests that the abrupt breakup of stratocumulus cloud decks above ~1200ppm CO2 may have resulted in around 8°C of global warming12. Some early results from the latest climate models – run for the IPCC's sixth assessment report (AR6) due in 2021 – indicate a much larger climate response to doubling of atmospheric CO2 than previous models. Early analysis links this to an altered balance of cloud feedbacks in the models. In particular, a new satellite observational constraint on the ice crystal content of clouds weakens a crucial negative feedback in the models, increasing their climate sensitivity13. Many more results are pending and further investigation is clearly required, but in our view these early results might suggest that a global tipping point is possible. To address these issues, we need models that capture a richer suite of couplings and feedbacks in the Earth system, and we need to improve both present and past data constraints on climate models. Improving models' ability to capture known past abrupt climate changes and 'hothouse' climate states should increase confidence in their ability to capture potential future abrupt climate changes and 'hothouse' climate states. Some may respond that the possibility of global tipping remains highly speculative. However, given its huge impact and irreversible nature, any serious risk assessment must consider the evidence concerning this risk, however limited our understanding may still be. **To err on the unsafe side is n**ot a responsible option.

<Not redacted just condensed>

If damaging tipping cascades can occur and a global tipping cannot be ruled out,then this is an existential threat to civilization and no amount of economic cost-benefit analysis is going to help us. Instead we need to change our approach to the climate problem. Act now We think that the evidence from tipping points alone suggests we are in a state of planetary emergency, where both the risk and urgency of the situation are acute (see: Defining emergency). We argue that the intervention time left to prevent tipping may already have shrunk towards zero, whereas the reaction time to achieve net zero emissions is at best 30 years. Hence we may already have lost control of whether tipping happens. A saving grace is that the rate at which damage accumulates from tipping – and hence the risk posed – may still be somewhat under our control. The stability **and resilience of our planet is in peril, and international action** – not just words – **has to reflect this**.

Contention 2 is Defense Logistics

Shell

US energy deployment capacity is at an all time low, which decimates US power projection capability, Horwood 24 states

Aaron **Horwood**, 7-16-20**24**, "DOD's Need for a Transportable Energy Solution: The Promise of Nuclear Power", Defense Logistics Agency, https://www.dla.mil/About-DLA/News/News-Article-View/Article/3842532/dods-need-for-a-transportable-energy-solution-the-promise-of-nuclear-power/, accessed 2-21-2025 //LFP

In the 42 days following Hurricane Maria in September 2017, the Federal Government deployed 366 generators with a combined 122-megawatt electric (MWe) capacity to Puerto Rico.1 This supported one-third of critical infrastructure on the island but fell far short of the ~2,400 MWe normally needed just in San Juan. This disaster highlights a **profound** Department of Defense (DOD) capability gap in providing large-scale transportable electrical power generation to the Defense Support of Civil Authority (DSCA) mission. This disaster should stand as a stark warning to planners as DOD refocuses on peer competition, fields ever more energy-intensive technologies, invests in forward synthetic fuel production, transitions to an all-electric ground, and addresses climate change. For context, the 500,000 gallons of fuel required daily by a single U.S. Army division would require at a minimum the equivalent of ~214 MWe of generating capacity to replace the current liquid fuel logistic system—and the Army represents only ~13 percent of annual DOD energy usage. The severity of this dual-capability gap will only grow as natural disasters abound, the U.S. power grid ages, and peer competitors invest more deeply into antiaccess/area-denial and merchant raiding capabilities. Failure to change course could result in the unnecessary suffering of American citizens at home and force a future retreat from global engagements–**a retreat that we cannot afford**. Recent DOD energy innovation has occurred in the context of Iraq, Afghanistan, and global warming. Major lines of effort include efficiency improvements, adoption of wind and solar power, incorporation of biofuels and synthetic fuels, and the Strategic Capabilities Office's small 1–5 MWe modular nuclear microreactor (Project Pele), which is currently being built and will be in operation at the Idaho National Laboratory in early 2025. These efforts are valuable, but in their current forms they cannot meet the energy needs of today's DSCA mission, which is tomorrow's war. This is not a new problem and there are historic solutions. Throughout World War II and the Korean War and during parts of the Vietnam War, the U.S. military projected large-scale electrical generation capacity at home and overseas through a three-part strategy. First it tied into, repaired, and upgraded existing infrastruc- ture as able. Then it used large floating power plants to meet large-scale energy demands, such as port of entry, cities, or entire regions. Finally, it pushed small land-transportable generators forward to power critical or isolated military and civilian infrastructure and equipment. DOD will require multiples of gigawatt electric (GWe) of new clean, reliable generating capacity to meet its installation and operational energy needs. Moreover, it must regrow its atrophied small land-transportable capability tanker fleet and reintroduce a power-barge capability operating in the 25–50 MWe and 100–300 MWe ranges. **The only mature technology that can meet both the scale of this demand and meaningfully cut the tether of fuel is nuclear power**.

Increased investment in transportable nuclear capability is key to military effectiveness Horwood 24 states

Aaron **Horwood**, 7-16-20**24**, "DOD's Need for a Transportable Energy Solution: The Promise of Nuclear Power", Defense Logistics Agency, https://www.dla.mil/About-DLA/News/News-Article-View/Article/3842532/dods-need-for-a-transportable-energy-solution-the-promise-of-nuclear-power/, accessed 2-21-2025 //LFP

military power requirements have only ever grown; a conservative approach, then, is to ensure that new energy technologies can at least meet that need and can be scaled up. Historically, liquid fuel and water by volume represented between 70 to 90 percent of all logistical operations in Afghanistan and Iraq, and **hostile attacks during its ground delivery accounted for roughly 52 percent of casualties**.2 The cost of a gallon of fuel ranged between $10 and $50, with common outliers of up to $400. If the United States were fighting a different kind of enemy—a sophisticated enemy that could strike assets on the high seas and in the United States—the resulting costs in human lives and dollars could be substantially higher than in those recent conflicts.

The 249th Engineer Battalion (prime power) is responsible for the Army's expeditionary power capabilities and currently fields only 26 MEP-810 dual generators that provide approximately 1.3 MWe per platform, for a total organic capacity of roughly 34 MWe. Additionally, some systems such as the Terminal High Altitude Area Defense system require similar generators. Expanding this system to meet the needs of an all-electric division is impractical. A single division would require a minimum of 165 MEP-810s (7 prime power battalions) operating at 100 percent of baseload power, and still would require approximately 360,000 gallons of fuel daily. Smaller tactical generators would be even more inefficient. For 50 kilowatt-electric gen- erators, a division would require ~4,275 generators and ~465,000 gallons of fuel daily. This approach would be akin to the Tesla driver leaving home with a diesel generator and gasoline can in the car's trunk; the driver simply made a hybrid vehicle with extra steps. These numbers are best-case ones and could easily double once maintenance cycles, peak power requirements, and margins for combat losses are considered. Problems With Renewables Renewables such as solar and wind cannot meet operational energy demands and will struggle with DOD installation energy needs. Simply put, to reliably meet the scale of demand would require an impractical number of systems, both in terms of operation and cost. Assuming, generously, no atmospheric losses, an 8-hour daily window, a 20-percent-efficient solar panel, and a solar constant of a 1.367kW/m2, a single division would need to be able to capture 2.58km2 of sunlight. To put this number in perspective, the largest U.S. solar and wind farms would struggle to meet this energy demand. Solar and wind can provide small amounts of power to individual Soldiers, sensors, and small systems in isolated or forward positions, but they cannot provide the bulk power that will be required in the operational and strategic support areas. When the full system-leveled cost of electricity is applied (which includes reliability and integration into the grid), **the cost-effectiveness of renewables is questionable even for large-scale installation energy baseload use**. Green/Synthetic Fuels Even with a successful changeover to electric vehicles, some liquid fuel requirements will remain for small forward traditional generators and combat aviation assets. Biofuels and synthetic fuels are a carbon-neutral approach. Unless their production is in theater, these novel fuels will have all the problems of JP8 with none of its robust supply chain. Forward production of any synthetic fuel will require the creation of hydrogen from water through electrolysis or by thermo-chemical means. That hydrogen then can be used directly in a fuel cell, combined with carbon or nitrogen feed- stock, or be pulled directly from the air or ocean to create any hydrocarbon or ammonia-based liquid fuel.

<Not redacted just condensed>

Transportable nuclear reactors can provide the energy for large-scale transportable synthetic fuel creation. To show scale, a 2019 analysis from the Massachusetts Institute of Technology found the energy output from a single Navy aircraft carrier reactor could be used to produce approximately 300,000 gallons of JP5 a day, or around 107,000,000 gallons annually.3 Supply Chain Vulnerabilities The ability to project force globally is a unique and decisive advantage of the American military, but the logistics of liquid fuel pose a severe vulnerability. A secured and lengthy supply line is required to get liquid fuel into theater:

the line stretches from oil fields and refineries in the United States to the U.S. Merchant Marine, then to the port of entry, and finally to the end user. **The** sustainability of this system is not assured **in today's threat environment, just as it has not been in previous periods.** This same need for assured freedom of movement in the face of extended vulnerable supply chains is why the Navy adopted nuclear power in the 1950s. Fuel requirements defined the Pacific theater in World War II. It is why the Japanese attacked, it defined what was possible in U.S. operations, and the loss of fuel was one of the primary causes of Japan's defeat. At Pearl Harbor, the Japanese failed to destroy the fuel farms or the fleet oilers on station. Regarding this failure, Admiral Chester Nimitz stated: "[H]ad the Japanese destroyed the oil, it would have prolonged the war another two years."4 Historians believe that the loss of this oil would have forced a withdrawal of U.S. forces to the continental West Coast and prevented nearly all offensive or defensive operations for at least a year. As it was, the Navy was still largely bound to its ships' 4- to 5-day in- ternal fuel supply, as it had only 11 of the 72 fleet oilers it required in the Pacific. Additionally, there were major fuel shortages, which by the end of 1942 were bad enough that the fuel in the sunken ships at Pearl Harbor was siphoned off for use. The Battle of Guadalcanal highlights this situation, as only 2 days into the battle the Navy was forced to withdraw to refuel, denying the ground troops critical air and naval artillery support. Another metric of fuel importance in World War II is that the U.S. Merchant Marine sustained the highest casualty rate of any branch in World War II. In 1942, it suffered the destruction of a quarter of the U.S. tanker and oiler fleet. The British Falklands War is a more modern example where projection of liquid fuel was a primary problem that British logisticians faced. Another modern example is the Russian Federation's struggle to resupply its forces in Ukrainian areas only a few hundred kilometers from the Russian border. Why Nuclear Works DOD must scale up its liquid fuel system and expand its nuclear capabilities. Liquid fuel is something that DOD is comfortable using, but continued reliance on its traditional supply chain will not reduce the logistic

constraints, vulnerabilities, or carbon emissions it imposes.

<Not redacted just condensed>

Strategic Posture Commission again notes the connection between adequately resourcing U.S. conventional forces and the potential need to rely more on nuclear forces should U.S. officials chose not to adequately resource conventional forces: "In short, shifting to a necessary two-war construct requires increases in the size, type, and posture of U.S. and allied conventional forces. In the absence of such increases, the United States will likely have to increase its reliance on its nuclear deterrent."21 There are few public indications as to whether the incoming Trump Administration will adopt the Strategic Posture Commission's recommended two-war construct for sizing America's conventional forces, but clearly **the growth in threats of Russian and Chinese aggression in their respective geographically-distant theaters indicates some major changes are necessary in the way the United States and its allies posture their conventional forces**.

Finally, officials must consider one last element in the U.S. arsenal to deter strategic attacks: homeland integrated air and missile defense (IAMD). As stated earlier, deterrence threats of cost imposition cannot be fully evaluated for their effectiveness without reference to deterrence threats of denial—they are, in fact, mutually supportive. To illustrate, consider the case of U.S. extended nuclear deterrence. As Lawrence Freedman has written, “The nagging question remains: why should states base their international behavior on the presumption that they have the backing of a particular super-power, when the implications for the super-power are potentially suicidal?”22 That is, if an adversary conducts limited nuclear strikes on a U.S. ally, the ability or inability of the United States to defeat that same adversary's coercive strikes on the U.S. ho

<Not redacted just condensed>

Nuclear power is a high energy-density, low-carbon solution that the Navy has proved can be used to cut the tether of fuel for key DOD assets. It also proves that concerns about the use of nuclear reactors in military operations can be allayed—the Navy deploys them in its most valuable combat assets, while assets like a Pele microreactor or larger floating reactor would be largely constrained to DOD installations and strategic and operational support areas. In the last 70 years, the Naval Nuclear Propulsion Program has operated over 526 reactor cores, and today's fleet operates around 93, with another 26 under construction or on order. These reactors operate in power ranges required by DOD and the commercial sector. Its submarine reactors operate somewhere around 50 MWe, and carriers carry two reactors each operating at 300 MWe. The reliability, freedom of maneuver, and near flawless history of the naval nuclear propulsion program has won the trust and acceptance of the American people, of the U.S. Government, and of many in the international community. While the Navy has a substantial nuclear and nonnuclear generating capacity, it is currently not equipped or designed to pro- vide significant and efficient ship-to-shore power, and doing so for any significant period would incur a high opportunity cost. For these reasons, a purpose-built fleet of nuclear power barges both in the ~25–50 MWe range and the ~100–300 MWe range would be ideal to provide the main bulk of DOD transportable energy needs. To be clear, these power barges/ships should use low-enriched or high-assay low- enriched fuel so that they can be deployed domestically and exported internationally for commercial use. These platforms do not require the high enrichment and yearslong staying power seen in Navy Nuclear Propulsion Program reactors. Deployment of such a capability would benefit the program, and commercialization would see a proliferation of American shipyards.

Effective decentralized supply chains are crucial to winning great power wars- protracted supply chains are vulnerable to attacks and reliance undermines deterrence, Esteves 21 states

Alan **Estevez**, 6-9-**2021**, "The Changing Character of Supply: Rethinking Logistics in an Era of Systems Warfare", Modern War Institute -, https://mwi.westpoint.edu/the-changing-character-of-supply-rethinking-logistics-in-an-era-of-systems-warfare/, accessed 3-3-2025 //LFP
**Modified for readability

rethinking logistical practices against peer adversaries waging systems-confrontation warfare specifically designed to counter friendly capabilities means abandoning reliance on some familiar capabilities such as **linear supply chains**. The United States and its allies should create interconnected physical-digital networks that can not only pair demand with supply and mobility at the tactical edge but also coordinate production capacity in real time for the industrial base. This is not a new concept—commercial industries have been using such digital supply networks for the past few years—but it is new at the scale demanded by great power warfare. In essence, **winning a great power conflict depends on creating systems combat logistics to succeed in a systems-warfare environment**. Why is Logistics so Hard in Great Power Warfare? Many more spaces will be contested. Systems warfare is a strategy to disrupt, disable, and destroy an adversary's operational systems that enable military functions—command and control, information, intelligence, fires, movement and maneuver, protection, and sustainment. To put it simply, a modern military operates through a system of systems. From battle networks to supply chains, operations depend on systems of communications, data, and physical and digital infrastructure all working together. Therefore, disrupting or disabling such a system requires an ability to deploy cyber, electronic warfare, information operations, and conventional kinetic-strike capabilities across all operational domains. Done right, an effective system destruction campaign can paralyze an adversary by obstructing the digital and physical links connecting troops, weapons, [and] resources, and leaders at a scale and speed not yet seen in warfare. Contested spaces will persist. To defeat an adversary, warfare typically reflects strategies of annihilation, exhaustion, or attrition. But as Andrew Krepinevich Jr. points out, **in protracted great power warfare between nuclear powers**—which is what the United States should be prepared to fight unless it is willing to vertically escalate to mutually assured destruction—**neither annihilation nor attrition are likely options, leaving exhaustion the most probable course**. Assuming a strategy of exhaustion requires time to exhaust one's adversary and having the resources (i.e., beans and bullets) necessary to do so. Avoiding exhaustion and persisting in great power warfare defined by systems destruction means current US logistical and industrial base practices simply will not work. The People's Liberation Army's (PLA) long-range precision-strike capabilities are designed specifically to prevent the United States from establishing a logistical advantage prior to combat operations. The current US reliance on pre-positioned stockpiles would be static and vulnerable

Logistics are key to deterrence posture- only way to check both great powers, Weaver 24 states

Greg **Weaver and** Amy **Woolf**, 2-2-**2024**, "Requirements for nuclear deterrence and arms control in a two-nuclear-peer environment", Atlantic Council, https://www.atlanticcouncil.org/in-depth-research-reports/report/requirements-for-nuclear-deterrence-and-arms-control-in-a-two-peer-nuclear-peer-environment/, accessed 3-3-2025 //LFP

Deterring large-scale conventional aggression Deterring conventional aggression by Russia or China individually is conceptually simple but operationally complex. The United States and its allies and partners must be **perceived by Moscow or Beijing as willing and capable of fighting and winning a large-scale conventional conflict**. This requires conventional military superiority applied in a way that defeats the adversary's strategy. But there is an additional element required to deter large-scale conventional aggression by a nuclear peer adversary: one must also convince such an adversary that it cannot escalate its way out of failed conventional aggression through nuclear means to force war termination on terms either favorable or acceptable to the adversary. Thus, the second deterrence objective of deterring limited nuclear escalation contributes directly to achieving the first deterrence objective as well. But what about deterring opportunistic or collaborative large-scale conventional aggression? This is a much tougher challenge, requiring US, allied, and partner conventional superiority and the ability to deter limited nuclear escalation in both theaters. Because the US forces required to achieve conventional superiority in Asia are somewhat different from those required to do so in Europe, there are potential adjustments to US and allied and partner conventional force structure and posture that could achieve superiority in both theaters. The **primary operational limitation on the ability of the United States to fight and win in both theaters simultaneously is logistics**: the strategic airlift and sealift needed to get required forces where they need to be and then sustain them in combat,

The Impact of Deterrence failure causes nuclear war with Russia and China- Costlow 25

Matthew R. **Costlow**, **2-3**-2025, (Matthew R. Costlow is a Senior Analyst at the National Institute for Public Policy and former Special Assistant in the Office of Nuclear and Missile Defense Policy, Department of Defense.)"Matthew R. Costlow, Deterrence is Integrated in Theory, but not in Practice: The Problem and (Partial) Solution, No. 614, February 3, 2025 – Nipp", National Institute for Public Policy, https://nipp.org/information_series/matthew-r-costlow-deterrence-is-integrated-in-theory-but-not-in-practice-the-problem-and-partial-solution-no-614-february-3-2025/, accessed 3-3-2025 //LFP

**Modified for readability

The renewed growth in Russian nuclear threats and the ongoing breakout of China's nuclear capabilities, when paired with their revisionist political agendas aimed at U.S. allies and partners, makes changes in the U.S. non-strategic nuclear posture all the more essential.

As the 2023 bipartisan Strategic Posture Commission recommended, the U.S. theater nuclear posture should be "urgently modified" in a manner consistent with the broad-based nature of deterring strategic attacks, i.e., modifications to incentivize adversary restraint to remain below the nuclear threshold, to give up on conducting additional nuclear attacks should nuclear deterrence fail initially, and to provide reasons for a conflict of any type to remain localized to the theater of operations.[19] Again, if the U.S. goal is to deter adversary escalation from a conventional conflict to a nuclear conflict, or to keep a limited nuclear war from escalating further, then it requires a significant set of theater-based nuclear capabilities to link the credibility of deterrence threats from the lower levels of violence in a conventional conflict to the highest levels of violence in a nuclear conflict. Dismissing this need for additional theater- based non-strategic nuclear options in favor of relying on conventional forces risks incentivizing adversary escalation to a level where they have the advantage, that is, at the theater-based non-strategic nuclear level.[20] At the conventional level, the 2023meland might heavily influence the course of action U.S. officials decide to take in response. A U.S. president is going to clearly prefer military options that minimizes the risk of nuclear escalation the United States bears and reduces the potential damage to the U.S. homeland, while still providing an effective response in defense of allies. Indeed, U.S. homeland IAMD can provide significant deterrent effects, depending on its capabilities, from the conventional level up to the strategic nuclear level. For instance, U.S. homeland IAMD acts as both a deterrent in and of itself as well as a deterrence enabler for U.S. conventional forces.

<Not redacted just condensed>

Russia and China [they] are developing the forces necessary to threaten U.S. power projection capabilities from the homeland, whether at or below the nuclear threshold

.[23] The ability of U.S. homeland IAMD to protect those power projection capabilities against coercive attack presents both a deterrence threat of denial while also strengthening the credibility of the deterrence threats of cost imposition via power projection from the homeland to allies overseas. Or, for an example in the nuclear realm, consider how U.S. homeland IAMD in conjunction with a significant set of theater-based non-strategic nuclear options could help deter an adversary from expanding a regional conflict into a homeland-to-homeland conflict. A robust U.S. homeland IAMD system presents the adversary with the possibility that his attack might result in the worst of both worlds: a denial of the intended benefits and the imposition of unacceptable costs as a result of the U.S. response. Given the inter-related nature of deterrence threats of denial and deterrence threats of cost imposition, and the growth of deterrence requirements increasingly being placed on U.S. conventional and nuclear forces, the incoming Trump Administration should consider announcing a new U.S. policy: that nuclear modernization and the expansion of U.S. homeland IAMD are now the twin priorities of the Department of Defense. As noted earlier, sustained presidential leadership is the essential prerequisite to enact major changes in the U.S. defense strategy, and the inclusion for the first time of a robust set of homeland IAMD capabilities as part of the mutually-supporting deterrence threats against growing nuclear and non-nuclear threats merits such attention. Additionally, Congress should consider reinstating the requirement that the Secretary of Defense submit an annual report to Congress as the Secretary historically did from 1959-2005, or else mandate that the National Defense Strategy (which replaced the Secretary's annual report) be more comprehensive in substance. Secretary of Defense James Schlesinger's annual reports to Congress for FY1975 and FY1976 are excellent examples of how the U.S. understanding and practice of deterrence should be presented. In those reports Secretary Schlesinger justified why the strategic, non-strategic, conventional, and missile defense forces the Department of Defense was requesting in its budget were necessary to achieve national political goals through clearly articulated strategies.[24] Reinstituting the requirement for an annual Secretary of Defense report to Congress would make the Nuclear Posture Review and Missile Defense Review reports either redundant and unnecessary, or else they could shift their focus away from explanation and towards implementation. As part of the United States refocusing on thinking about and practicing deterrence as a unified effort, U.S. officials should encourage their NATO allies to continue their progress on conducting conventional-nuclear integration exercises while improving in the areas of nuclear planning and exercises.[25] While conventional support for nuclear operations (CSNO) is an important area for allies to expand their participation, annual nuclear exercises like "Steadfast Noon" should practice and publicly describe allied actions to restore deterrence to counter multiple rounds of adversary nuclear employment.[26] While such an exercise may run counter to France's public nuclear policy, the more consequential concern is whether Russia perceives NATO capabilities and will as sufficient to deter and, if necessary, defeat its "dosing" strategy of coercive nuclear strikes.[27] Such exercises should incorporate ideally the full suite of military deterrence threats, both cost imposition and denial, because allied responses to the possibility or actuality of Russian nuclear employment would, in all likelihood, involve force posture changes in IAMD, conventional, and nuclear forces, among others. Again, some allies may be reluctant to participate in exercises their publics may perceive as "nuclear warfighting" (a perception Russia will work to promote in any case), but exercises must match the threat, lest Russia perceive NATO simply is not up to the task. Indeed, if NATO is not willing, and seen as willing, to even practice countering Russian nuclear doctrine with all the means at its disposal, then it will signal a critical weakness: lack of will. NATO nuclear policy and strategy must not rely on an idealized perception of Russian President Vladimir Putin, as someone who is as equally frightened of nuclear escalation as NATO

<Not redacted just condensed>

.**Deterrence must work on the continuum of conflict, and the opportunistic and militaristic Vladimir Putin knows his area of advantage in both capabilities and perceived will is at the regional nuclear level of war**.[28] Until NATO moves to alter his perception through undeniable changes in words and deeds, Putin will continue to press his advantage to the detriment of the alliance. Conclusion **The prospect of strategic attacks against the United States or its allies is so enormously consequential to vital U.S. national interests that deterrence threats against that possibility must be at least as equally severe and broad-based**.

Frontlines

Defense Logistics

deterrence:

Judge we should focus on strengthening alliances with countries in the indo-pacific region. This will be essential to containing nuclear proliferation. Bleek 10 found that US security guarantees:

[J.WELLINGTON BROWN, "INDISPENSABLE NATION: US SECURITY GUARANTEES AND NUCLEAR PROLIFERATION," A THESIS PRESENTED TO THE FACULTY OF THE SCHOOL OF ADVANCED AIR AND SPACE STUDIES FOR COMPLETION OF GRADUATION REQUIREMENTS SCHOOL OF ADVANCED AIR AND SPACE STUDIES AIR UNIVERSITY MAXWELL AIR FORCE BASE, ALABAMA JUNE 2017, https://www.hsdl.org/?view&did=813351 // Coach Pat]

Despite these modifications, Bleek arrives at similar findings as both the previous studies. He finds that economic and technical capacity is significant, but curvilinear, as it drops in significance as states become wealthier. Bleek also confirms the centrality of security explanations. He argues, "if an analyst were required to prognosticate proliferation dynamics on the basis of only one variable, states' conventional security environments would be the preferred choice."32 Although Gartzke and Jo did not find that security guarantees had a statistically significant effect on proliferation, Bleek finds that they reduc[ing] the risk of exploration by **59%, pursuit by 86%, and acquisition by 99%.** Bleek also makes an interesting discovery regarding reactive proliferation or the "nuclear domino theory". He finds that the pursuit of a nuclear weapon by a rival increases the likelihood of exploration by 400%, but has no statistically significant effect on exploration or acquisition. This effect is likely due to the relatively low cost of exploration and the ability of threatened states to gain security commitments with great powers hostile to further nuclear proliferation. Bleek further finds that status and regime type variables are not significant factors. He is also ambivalent on the role of the NPT. He concludes that while those who have ratified the treaty are less likely to explore nuclear weapons, it is unclear whether the treaty is a cause or consequence of nuclear restraint. Many states join the NPT because they do not intend to pursue nuclear weapons and then the institutional arrangements impose costs, though not insurmountable ones, to reneging on that commitment. Overall, Bleek affirms a security-model explanation for the determinants of proliferation. Bleek builds on his 2010 study in a 2014 article with Eric Lorber that specifically focuses on testing the importance of security guarantees to nonproliferation policies. They employ a multivariate hazard model with new dependent variable coding to **find with high confidence** that "states receiving security guarantees are less likely to explore, pursue, and acquire nuclear weapons." They pair this statistical analysis with a qualitative case study of the South Korea nuclear weap,ons program to conclude that there is a clear relationship between security guarantees and proliferation pressures.

Negating leads to rapid regional nuclear proliferation. Sacks 23:

[David Sacks is a fellow for Asia studies at the Council on Foreign Relations (CFR), where his work focuses on U.S.-China relations, U.S.-Taiwan relations, Chinese foreign policy, cross-Strait relations, and the political thought of Hans Morgenthau. In 2023, Mr. Sacks served as the project director for CFR's Independent Task Force on U.S.-Taiwan Relations, which was chaired by Admiral (ret.) Michael G. Mullen and Susan M. Gordon. He also co-directed CFR's Independent Task Force on China's Belt and Road Initiative, which was chaired by Jacob J. Lew and Admiral (ret.) Gary Roughead. He is a regular commentator on U.S.-Taiwan and cross-Strait relations. His writings have appeared in Foreign Affairs, The National Interest, Time, The Diplomat, The Hill, and the Georgetown Journal of International Affairs., 6-20-2023, "Why Is Taiwan Important to the United States?", Council on Foreign Relations, https://www.cfr.org/blog/why-taiwan-important-united-states // Coach Pat]

If the United States chose to stand aside in the face of Chinese aggression against Taiwan and China successfully annexed the island, it would be only seventy miles from Japanese territory and 120 miles from the Philippines. **U.S. allies would come to question whether the United States would or even could come to their defense.** Having lost confidence in the U.S. commitment to their security, allies would contemplate either accommodating China or **hedging against it by growing their militaries or even developing nuclear weapons.** Either outcome would result in diminished U.S. influence and **increased regional and global instability.**

Deterrence is still relevant, Roberts 15 states that: Peter Roberts and Andrew Hardie, August 2015, "The Validity of Deterrence in the Twenty-First Century", RUSI, https://static.rusi.org/201508_op_the_validity_of_deterrence.pdf

Modern examples of deterrence postures, activities and actions indicate their ability to remain viable concepts for defence and security. However, there is no single strategy of deterrence to counter threats and prevent conflict. Strategies of deterrence must be nuanced and contextualised to particular enemies, adversaries and geopolitical circumstances. This is a facet that could change the utility of deterrence in the future. If leaders do not understand the construction and execution of deterrence within the societal and technological context of the problem, delivering it successfully will be challenging. Interestingly, it does not appear that misunderstanding of this concept comes from current, future or potential adversaries; rather, it is Western decision-makers and leaders who have not taken the time to actively consider the relevance of the concept in the modern world. Activities and capabilities which underpin deterrence are not easy nor are they cheap. The investment in resources to deliver successful deterrence postures – militarily, economically and conceptually – is significant. Still, unlike many other national approaches to defence and security, it appears that deterrence will continue to be as relevant as it has always been. Those key requirements for successful deterrence can be summarised as follows: