We affirm, The United States federal government should substantially increase its investment in domestic nuclear energy.

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US heg is eroding

Warner 25 (Daniel Warner is the author of An Ethic of Responsibility in International Relations. (Lynne Rienner),February 14, 2025,"The United States is Falling Apart and the World is Taking Notice", Counterpunch,https://www.counterpunch.org/2025/02/14/the-united-states-is-falling-apart-and-the-world-is-taking-notice/, DOA 3/11/25) KC

The United States is imploding. The reign of Donald Trump is not only challenging and threatening the very foundations of its constitutional democracy, it is calling into question the U.S.'s post-World War II hegemonic role. Empires or hegemonic powers rise and fall. Often they are defeated by emerging powers. Sometimes their decline takes place over time. But rarely do they self-destruct as spectacularly as the U.S. is doing. **The U.S. implosion is dramatic in its intensity and rapidity. In just over three weeks, Donald Trump has been able to redefine the United States' position in the world from a global power to an international outcast.** Despite whatever military and economic power the U.S. still has, its image and global leadership have been undermined by President Trump's foreign policy decisions. The word "implode" is rarely used in international relations. The decline of empires or hegemonic powers is usually due to external forces. The Roman Empire fell because of a series of invasions by "barbarian tribes." The Ottoman Empire fell because it aligned with Germany during World War I and was formally dismantled after the War because it had chosen the losing side. The United States is now in the throes of losing its global position by an implosion based on President Trump's policies. Internationally, Trump has undermined the U.S.'s global image and influence by systematically provoking allies, neutrals and competitors. Besides targeted tariff threats and proposals for territorial expansion into Greenland, Panama and Canada, the president has made two policy decisions that have led to universal condemnation with major global repercussions. The first is his decision to gut the United States Agency for International Development (A.I.D.). While there are certainly inefficiencies in any institution that spent $38 billion in 2023 and operates in 177 different countries, A.I.D. has been fundamental in projecting a positive American image throughout the world. As an example of its outreach, Samantha Power, the former administrator of A.I.D., wrote in The New York Times how out of the $38 billion spent, "nearly $20 billion was for health programs (such as those that combat malaria, tuberculosis, H.I.V./AIDS and infectious disease outbreaks) and humanitarian assistance to respond to emergencies and help stabilize war-torn regions…Other U.S.A.I.D. investments…pay dividends in the longer term, such as giving girls a chance to get an education and enter the work force, on growing local economies." Foreign assistance is all about human capital. It is a crucial element in projecting soft power. When President John F. Kennedy established A.I.D. in 1961, he said in a message to Congress; "We live at a very special moment in history. The whole southern half of the world–Latin America, Africa, the Middle East, and Asia–are caught up in the adventures of asserting their independence and modernizing their old ways of life. These new nations need aid in loans and technical assistance just as we in the northern half of the world drew successively on one another's capital and know-how as we moved into industrialization and regular growth." He acknowledged that the reason for the aid was not totally altruistic, "For widespread poverty and chaos lead to a collapse of existing political and social structures which would inevitably invite the advance of totalitarianism into every weak and unstable area. Thus our own security would be endangered and our prosperity imperilled. A program of assistance to the underdeveloped nations must continue because the nation's interest and the cause of political freedom require it." The fear of Communism was obvious in 1961. The motivation behind U.S. foreign assistance is always humanitarian and political at the same time; the two can never be separated. **Today, the United States is competing with China and its Belt and Road Initiative for global influence. Trump's freezing and defunding U.S. foreign assistance is not a defeat to China; it's a default, a no-show. Defunding and freezing foreign assistance effects millions of people throughout the world and invites even allies to look to China as a partner in trade and development.** Whereas the A.I.D. example is an excellent case study of a major power purposefully retreating globally (withdrawal from the World Health Organization and the Paris Accord on climate change included), Trump's proposal for the Gaza Strip is an outright, active, foreign policy autogoal. (A former advisor to Bernie Sanders called it Trump's "apocalyptic daydream.") Trump's insistence that the United States will take control of Gaza, evicting almost two million people from their homeland in order to create a place "better than Monaco," "the Riviera of the Middle East," has generated international condemnation. "Forcible displacement of an occupied group is an international crime, and amounts to ethnic cleansing," Navi Pillay, chair of the United Nations Commission of Inquiry on the Occupied Palestinian Territory, told Politico. "There is no way under the law that Trump could carry out the threat to dislocate Palestinians from their land," she said. Politically, the Foreign Ministry of Saudi Arabia, a key actor in stabilizing relations in the Middle East, forcefully dismissed the proposal; "Saudi Arabia also reiterates its previously announced unequivocal rejection of any infringement on the legitimate rights of the Palestinian people, whether through Israeli settlement policies, the annexation of Palestinian lands, or attempts to displace the Palestinian people from their land," it said. Egypt, Jordan and other

Arab countries have also rejected the plan. King Abdullah II of Jordan gracefully avoided directly responding to the plan during his joint press conference with Trump. But following the meeting, the King said on X, "I reiterated Jordan's steadfast position against the displacement of Palestinians in Gaza and the West Bank. This is the unified Arab position." The only country who seem pleased is Israel, with Prime Minister Netanyahu smiling like a Cheshire cat listening to Trump present the plan during their joint press conference. In three weeks, Donald Trump has imploded whatever positive image the United States might have had internationally. While he may think he is doing what his MAGA followers want, international reactions – save Israel's – are further nails in the coffin of United States hegemony.

The US is behind on nuclear developments

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Dependence on Adversaries and the Importance of the Other Low-Carbon Power Source: Nuclear **China dominates global supply chains for renewable energy and batteries and is now setting its sights on becoming a superpower in nuclear energy.**[11] **China understands the simultaneous need for clean baseload power in the form of nuclear (despite China's current heavy reliance on coal) in addition to intermittent renewable energies. Over the past several decades, as the West has grown increasingly cautious about nuclear, China has forged ahead and is now building twenty-five reactors, more than the next six countries combined.**[12] **In fact, it has more nuclear reactors under construction than any other nation in the world, and approved ten new reactors in each of the past two years.13 The country is expected to surpass France and the United States to become the world's leading atomic power generator by 2030, according to BloombergNEF**.[14] **It also is responsible for a new breakthrough: a meltdown-proof nuclear reactor, which has been a goal for several U.S. companies like X-energy and Kairos, as well as the U.S. Department of Defense, but which China is building faster**.[15] **China's new nuclear dominance would be added to its control of solar, wind, and EVs (through the magnetic motor and lithium-ion battery supply chain).16 It already processes 90 percent of rare earth elements and 60 to 70 percent of lithium and cobalt (which China manufactures with very low environmental and labor standards).17 Overall, the United States is reliant on other countries for its critical minerals, needing to import more than half its supply of thirty-one out of the thirty-five minerals defined as critical by the government in 2018; the country also has no domestic production at all for fourteen of those minerals.**[18] **The United States must double-track its energy efforts just as China has: work to increase nuclear power as a workhorse that can ensure the United States has reliable electricity, while also (re)establishing domestic renewable supply chains and manufacturing. In other words, America needs to build—and lead—in multiple forms of energy.** Unfortunately, it seems the United States cannot get out of its own way. According to a 2022 International Energy Agency (IEA) analysis that describes the path to reach net zero by 2050, the world would need to double its nuclear energy capacity even with the assumed exponential growth in solar and wind.19 The IEA's model assumes an average of 30 gigawatts of new nuclear capacity coming online every year starting in the 2030s and staying on that track for another two decades, until 2050. The math then becomes clear: **the world needs to build and turn on the equivalent of 180 more 1,000-megawatt reactors, or twenty-five more new reactors per year, by 2030, with further growth afterward in order to hit the 2050 target.20 If all of those reactors are built by China and Russia, not just for their domestic use but also for export, other countries will be locked into their tech and supply chains for decades. Russia**

supplies more than 40 percent of the world's enriched uranium, including about 20 percent of what the United States uses, which means one in twenty American households were powered by Russian-enriched nuclear fuel in 2022.21 Fortunately, lawmakers passed the Prohibiting Russian Uranium Imports Act, signed by President Joe Biden in May 2024, which bans unirradiated low-enriched uranium from Russia or Russian firms from being imported into the United States, with the goal of increasing U.S. production.22 The law includes nearly $3 billion in federal funding to expand the domestic uranium industry in hopes of building demand, and will also help build new low-enriched uranium supply (which is what current reactors use as fuel) as well as create capacity to produce high-assay low-enriched uranium (HALEU, which is what advanced and next-generation reactors use as fuel). **Adding Russia and China together, these two U.S. adversaries control nearly 60 percent of the world's supply of enrichment needed to fuel the next generation of reactors.23 China also intends to build a total of 150 new nuclear reactors between 2020 and 2035, which includes a target of selling thirty nuclear reactors via its Belt and Road Initiative to states it considers its vassals.**24 And thanks to its massive state support system, **China can build a lot cheaper: it has already bid to build Saudi Arabia's first nuclear plant at a price at least 20 percent lower than competing bidders.25 China now seems to be at least a decade ahead of the United States in nuclear power, specifically because of its ability to field fourth-generation reactors; is poised to build six to eight new nuclear power plants each year; and is expected to surpass the United States in nuclear-generated electricity by 2030.**26 **China is expected to finish its first commercially operating SMR by 2026, while leading U.S. advanced nuclear firm TerraPower is expected to be online by 2030.**27 **In addition, the current U.S. nuclear fleet is aging. The vast majority of American nuclear capacity was built between 1970 and 1990**, with the country's newest plant (Plant Vogtle's AP1000 reactor in Georgia) completed in 2024.28

Aff investment is key

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Unfortunately, as industry analyst Luongo observed, "**It is generally agreed the U.S. has lost its global dominance in nuclear energy**."103 Therefore, the United States needs to develop a coherent national strategy and whole-of-government approach to reanimating the deployment of modern nuclear reactor technology. This should be predicated on the recognition that **America's current nuclear installed base is aging rapidly, and**, more importantly, that **modern nuclear reactor technologies are substantially safer and more efficient** (in producing energy from a given set of fuels) **than previous designs**. It should also be predicated on a recognition **that if the United States is to contribute to global clean energy and decarbonization objectives, an embrace of nuclear energy must be part of an "all-of-the-above" energy strategy**. A recent U.S. Department of Energy (DOE) report suggests that if the United States commits more to nuclear, **it could triple its nuclear-power generation to 300 GW by 2050** (and make an important contribution toward meeting America's net-zero emission goals).104 **This would also promote U.S. energy security and the resilience of America's energy system. Policymakers will need to both fund the future and provide necessary funding today to appropriately maintain America's existing fleet of nuclear reactors, building upon Congress's creation of a $6 billion relief fund in the 2021 Bipartisan Infrastructure Investment and Jobs Act** (BIIJA), whose intent is to preserve America's existing nuclear fleet and related jobs through 2031.105 The 2022 Inflation Reduction Act also includes tax credits through 2032 for existing U.S. reactors. (The advanced nuclear tax credit under Section 45J of the Energy Policy Act of 2005, which offers a maximum 1.8 cent per kilowatt-hour credit, continues to be the only currently available federal generation credit for new nuclear electricity generation facilities not yet placed into service.)106 **DOE's Advanced Reactor Demonstration Program (ARDP), launched in**

2020, seeks to speed the demonstration of advanced reactors through cost-shared partnerships with U.S. industry. Since its 2020 launch, Congress has appropriated $3.2 billion to the program, including $2.48 billion in funding through FY 2025 as part of the BIIJA. The agency is extending awards to applicants developing: 1) advanced reactor demonstrations, which are expected to result in a fully functional advanced nuclear reactor within seven years of the award; 2) advanced reactor concepts 2020 (ARC 20), which will support innovative and diverse designs with potential to commercialize in the mid-2030s; or 3) risk reduction for future demonstrations.107 In total, DOE is supporting 10 U.S. advanced reactor designs to help mature and demonstrate its technologies.108 **There are many promising potential U.S. nuclear power innovators**. For instance, **Bellevue, Washington, and Bill Gates-backed TerraPower is developing a sodium fast reactor combined with a molten salt energy storage system and X-energy is developing a Gen-IV High-Temperature Gas-Cooled reactor**. (Bechtel is the engineering, procurement, and construction provider for TerraPower in deploying its Natrium technology.)109 In June 2024, TerraPower announced it was commencing construction in Wyoming on its advanced nuclear reactor, with an expected launch date of 2030.110 Elsewhere, NuScale seeks to launch a scaled-down light water reactor (LWR) and Westinghouse is developing the AP300, its own scaled-down LWR.111 Yet, **none of these are expected to enter even the demonstration stage until 2030, at the earliest, which means China has opened a significant lead over the United States in the development of fourth-generation nuclear technology**. And **even considering the prior generation of reactors, notably the Westinghouse AP1000, China was deploying their versions of them as early as 2017, while as noted the Vogtle Unit 4 has just now come online, meaning that China is years ahead of the United States in even deploying our country's own technologies. Policymakers will also need to support the economics of new nuclear technologies. DOE estimates that nuclear reactors will need to cost about $3,600 per kilowatt to be built quickly and scaled around the country, but first-of-their-kind reactors are costing anywhere from $6,000 to $10,000 per kilowatt.**112 **The United States will also need to work to develop domestic fuel enrichment capacity for these projects. For instance, DOE is currently trying to enable domestic high-assay low-enriched uranium** (HALEU) **production capabilities** via the HALEU Availability Program, through which DOE will acquire HALEU through purchase agreements with domestic industry partners and produce limited initial amounts of material from DOE-owned assets.113 Of course, production at scale can reduce per-unit costs, but this requires a sustained commitment to comprehensive buildout. Another challenge pertains to skills: DOE estimates that if the United States is to meet the aforementioned 2050 target of tripling nuclear energy production, America would need an additional 375,000 skilled engineers, technicians, and construction personnel in the sector to support such a buildout.114 As such, the United States needs to revamp its approach to supporting next-generation nuclear initiatives. Notably, both ARDP and the Nuclear Regulatory Commission (NRC) need more resources, in terms of funding and manpower, in part so they can pay market rates to the staff that will be needed to evaluate the wider variety of proposed nuclear designs to come. ARDP also needs a better down-selection process for the demonstration projects it's currently funding. In particular, it appears that the current DOE approach envisions going from start-up to commercialization immediately; instead, DOE should have grant recipients produce a pilot-scale demo, such as in the 5–10 MW range, as part of the down-selection process, before going full commercial. If nuclear energy is going to become a considerable export product for the United States again, then U.S. companies well need to be better supported in their efforts to sell into global markets. The United States should develop a "one-stop-shop" approach, including the U.S. Export-Import Bank (EXIM), U.S. State Department, and other relevant agencies so that foreign buyers of U.S. nuclear exports can deal with a single entity rather than multiple agencies to complete deals (as Russia's Rosatom does). It should also be made clear that nuclear is a qualifying technology for the EXIM's China and Transformational Exports Program (CTEP), whose intent is to assist U.S. exporters facing competition from China and which makes qualifying companies in the program eligible for reduced fees, extended repayment terms, exemptions to EXIM policy requirements, and other benefits.115 To its credit, America's State Department has established partnerships with more than a dozen countries to help them fund and develop nuclear-energy programs and, eventually, SMRs.116 Here, **the United States could also expand the Foundational Infrastructure for Responsible Use of Small Modular Reactor Technology** (FIRST) **program, a multiagency U.S. government initiative that provides capacity building support to help partner countries safely and responsibly build an SMR or other advanced reactor program, to include more countries.**117 The United States also has to negotiate civil nuclear cooperation agreements with foreign governments (Section 123 agreements) and has been quite slow in doing this; enhanced staffing at DOE and the State Department could better support this, along with making a list of priority countries in the Global South with which to promote U.S. nuclear technology exports. The United States has historically been a leader in nuclear fusion research, most notably with regard to the National Ignition Facility achieving the first net-energy gain nuclear fusion reaction in December 2022.118 Still, **the United States needs to build a comprehensive nuclear fusion strategy and strengthen investments therein**: While the federal government will invest $790 million in fusion science programs in 2024, advocates had sought for at least $1 billion in investment.119 Moreover, as one commentator observed, "The Biden administration has taken steps in the right direction with its development of a Bold Decadal Vision, recognizing the technology's potential as a clean energy source, but has not translated this into a large-scale push."120 U.S. policy should work to more strongly coordinate government, academic, and private sector efforts in nuclear fusion and empower DOE with a mandate to achieve commercial fusion power as soon as possible.121 A comprehensive strategy and sustained investment will be needed, for nuclear fusion represents yet one more arena where the technical, scientific, and commercial competition will be fierce between China and the United States in the years ahead. For this reason, recent administrations have clamped down on the transfer or export of nuclear technologies to China. In January 2019, the Trump administration scuttled a 2015 agreement TerraPower had signed with CNNC to build a prototype 600 MW reactor at Xiapu in Fujian province.122 Further, in August 2019, the United States placed China General Nuclear Power Group and three of its subsidiaries on its Entity List because they had "engaged in or enabled efforts to acquire advanced U.S. nuclear technology and material for diversion to military uses in China."123 And in August 2023, the Biden administration further tightened controls on the export of materials and components for nuclear power plants to China.124 China has become America's leading geostrategic competitor, and America needs to completely cease any sharing of its nuclear technologies with the country. Lastly, the United States needs to be working more closely with its own allies, including France, Germany, Japan, South Korea, and Sweden (among others), to collaborate on R&D for advanced nuclear technologies and to help promote nuclear exports from techno-democracies to third-party markets. Indeed, considerable collaboration could be achieved in the regulatory, procurement, and contracting spaces. For instance, the United States could allow foreign companies in allied countries to own reactor licenses in the United States in order to promote foreign investment and accelerate domestic deployment. Further, the United States could lean into international efforts to standardize and harmonize design and testing standards, such as those embodied in IAEA's SMR Platform and Nuclear Harmonization and Standardization Initiative.125 NRC should provide limited endorsement of internationally recognized quality assurance standards, testing standards, design methodologies, and safety analysis methodologies for advanced reactors. That would allow U.S. suppliers to learn and assess what allied countries are doing without reinventing the wheel in the United States and open the door for more international collaboration while limiting redundant qualification work. The United States could also further relax import or export control of non-fuel or non-nuclear safety-related components (e.g., vessels, piping, testing services, etc.) to and from allied nations. This could include limited authorizations to be exempt from domestic sourcing on the procurement of systems, subsystems, and components related to advanced reactors from specific allied countries. Further, DOE could forge more bilateral agreements with allied R&D centers (e.g., the French Alternative Energies and Atomic Energy Commission (CEA), the UK Atomic Energy Authority (UKAEA), and the Korea Atomic Energy Research Institute (KAERI)) to provide funding to advance joint small R&D projects and data sharing. The United States could also explore joint financing of projects among allies; for instance, a foreign firm might be the prime contractor on a project, but firms from other countries could be involved too. That matters, for, ultimately, **every nuclear project America**, France, Germany, Japan, South Korea, or Sweden (or other allied countries) **completes instead of China and Russia in developing countries or other third-party markets represents a win for democratic, free-market economies.**

The time is now

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In addition, the current U.S. nuclear fleet is aging. The vast majority of American nuclear capacity was built between 1970 and 1990, with the country's newest plant (Plant Vogtle's AP1000 reactor in Georgia) completed in 2024.[28] **The United States should not wait decades to commission its next nuclear power plant; it is down from its peak of 112 reactors in 1990 to ninety-four operating today.29 Moreover, now is the time to double down on U.S. nuclear development and leverage a domestic workforce that has recently absorbed the know-how of nuclear reactor construction from Vogtle—what economists call diffusion of knowledge, which is essential for economic dynamism and innovation.**[30] **The longer the United States waits to construct a reactor, the more it risks a brain drain of the first batch of expertise gained in decades: some 14,000 workers (including engineers, welders, masons, electricians, mechanics, and support staff) helped to construct the Vogtle plant and could be deployed to build another AP1000 as quickly as possible to keep domestic know-how alive and to maintain nuclear power momentum.31** Meanwhile, China is taking the same approach with nuclear that it took with other forms of green energy: establish and subsidize domestic capacity as a foundation for competitive reactor exports. Beijing's "dual circulation" strategy to keep its economy from being reliant on imports, particularly from the West, was even enshrined in its constitution.32 It has successfully created Chinese dominance in mineral processing and overcapacity in clean tech, which are killing many domestic producers, not just those in the United States.33 China also got a great deal of help from the United States: one of the main U.S. nuclear firms, Westinghouse, agreed to license its tech to China over several years, even agreeing to allow China to export its technology—which seems like unwise policy in retrospect.34 Beyond that voluntary tech transfer, China's military also hacked Westinghouse and stole its "confidential and proprietary technical and design specifications for pipes, pipe supports, and pipe routing within the AP1000 plant buildings," as well as sensitive emails, according to the U.S. Department of Justice indictment.35 (Russia has also been charged with hacking Westinghouse in an effort to steal the company's IP.)36 **If the United States aims to avoid falling behind China on nuclear power, it will have to make producing energy within its own borders easier. That starts with making it easier to mine and build.** The Need for Permitting and Other Reforms to Enhance U.S. Energy Supplies **It's time to get moving. The United States must accelerate project timelines and streamline processes so developers can get more certainty from regulatory agencies at all levels (federal, state, and local). Costs would come down with increased system efficiency, which would make projects more viable financially from the get-go, and those savings could be passed on to consumers. Permitting reform would also improve investor confidence, particularly in newer, riskier technologies. And of course, permitting reform would allow the United States to be less dependent on foreign sources of energy such as China, which has shown that it is willing to use its economic dominance to punish countries that stand up against it. For example, after Australia called for an international investigation of the origins of COVID-19 in 2020, China banned imports of Australian coal for two years, as well as placing high tariffs on Australia's agricultural exports.37 China has been able to exert major economic influence thanks to its policy of creating state-owned enterprises that are given various subsidies, tax, and labor advantages, allowing them to dominate global strategic sectors—known as brute force economics.38 It would be a mistake for the United States, which reached full energy independence in 2019, to trade dependence on the Middle East's oil fields for dependence on China's energy supply chain.**39 On the nuclear side of the energy ledger, the Accelerating Deployment of Versatile Advanced Nuclear for Clean Energy (ADVANCE) Act, signed into law in July 2024, is a sign of progress toward making it easier to produce energy in the United States.40 The law will help **push forward more advanced nuclear projects by improving the regulatory regime, lowering licensing fees (with special incentives for next-generation SMRs), and giving the Nuclear Regulatory Commission more flexibility; it also strengthens international coordination.41 The United States needs to mine its own uranium for its nuclear plants, for which it also needs permitting reform. The country has 48,000 metric tons of identified recoverable uranium**

resources, yet only mined 6 tons, or 0.1 percent, in 2020.42 The United States has successfully mined uranium in the past—as recently as 2014, when U.S. production was 319 times higher at 1,919 metric tons.43 While the new ban on Russian uranium imports will help, the United States also gets one-quarter of its uranium from Kazakhstan, making it the second-largest source of supply to the United States after Canada.44 Recently, Kazakhstani company Kazatomprom, the world's largest uranium producer, announced a 17 percent production cut, potentially signaling a closer alliance between Russia and Kazakhstan.45 Amending the National Environmental Policy Act (NEPA) and minimizing red-tape bureaucracy would be a boon for the United States in developing these resources at home, especially the enriched HALEU fuels needed for SMRs, which today are only produced by Russia's state-owned nuclear firm, Rosatom.

This is k2 heg

Hiltibran et al 24 (Christel Hiltibran, Director of International Policy, Climate and Energy Program, Rowen Price, Policy Advisor for Nuclear Energy, Ryan Norman, Senior Policy Advisor for Clean Energy Finance, Climate and Energy Program, Alan Ahn, Deputy Director for Nuclear, 31 January 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#:~:text=A%20strong%20US%20nuclear%20energy,valuable%20hundred%2Dyear%20geopolitical%20relationships., DOA 3/1/2025) ESR

President **Trump has long considered himself a China hawk,** stoking a trade war with the country, supporting ever-increasing tariffs on its goods, and using aggressive rhetoric to combat its growing global influence. **But his approach has a blind spot, failing to mitigate China's increasing dominance in the energy sector, especially in nuclear energy development and deployment**. Until we confront China's rising role in global energy markets, **the US will continue to cede market share and lose geopolitical influence, threatening national security both in the US and among our allied nations**. The US needs a synchronized foreign policy to counter Chinese attacks on American hegemony. But since the election, **the incoming administration and Congress have signaled misaligned approaches to foreign energy policy**. The Trump Administration's Day 1 executive orders reaffirmed the President's commitment to domestic energy production—now it's up to Congress to ensure legislation is going to support energy goals. Nuclear Energy Must Be a Foreign Policy Priority 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.

Nuclear energy is increasingly geopolitically significant

Baker et al 17 (Suzanne Hobbs Baker: Former Visiting Fellow for Nuclear Security. Ryan Fitzpatrick: Senior Director of Domestic Policy, Climate and Energy Program. Matt Goldberg: Fellow, Clean Energy Program. 1/10/17, "Getting Back in the Game: A Strategy to Boost American Nuclear Exports", Third Way, https://www.thirdway.org/report/getting-back-in-the-game-a-strategy-to-boost-american-nuclear-exports //. DOA: 3/16/25)JDE

BACKGROUND Competing in the global civilian nuclear energy market should be a top economic priority for the U.S. **The Department of Commerce predicts that global demand for nuclear energy technology will total $500-$740 billion over the next decade**.1 And that's just the beginning. Leading authorities including the International Energy Agency **expect the world's nuclear capacity to double by 2050**,2 as developing economies try to keep pace with growing energy demand and most nations turn increasingly to low-carbon sources to meet emissions targets.3 **Capturing even a portion of a market this size would produce enormous rewards for American businesses and workers.** Also of interest for the United States, **nuclear deals create strong geopolitical ties between the selling country and the host country—a commitment lasting as long as the life of the project (between 50 and 100 years).** In essence, where you have civilian nuclear power deals, you have **long-term partnerships and greater chances for international cooperation. The U.S. was the dominant force in the global civilian nuclear trade for decades, enjoying both the rewards and responsibilities that come along with that**. As pioneers in nuclear energy innovation, the U.S. was able to develop world-class products and establish a successful export regime in the 1970's and 1980's. We are still making profits off of some of those earliest deals. Today, America has a multi-billion dollar nuclear energy industry that employs a domestic workforce of more than 100,000 people.4 At the same time, the U.S. has used its commercial leadership to establish global security standards. We have long been the largest contributor to the International Atomic Energy Agency, the United Nations' nuclear non-proliferation watchdog.5 The U.S. government also helps other nations with regulatory, safety, security, and innovation needs—even when there is no commercial benefit involved. We consistently put the safety and security interests of the global community first. This is what being a responsible world leader looks like. **In recent decades, however, the U.S. has lost its edge as a global exporter. Our products have a harder time competing with all-inclusive deals offered by Russia's state-supported industry and may soon face additional challenges like lower-cost**

Chinese reproductions.6 **Losing this market** share hurts more than just the bottom line for our producers and workers. It **limits our ability to influence global standards. It also allows our competitors to lock-in long term, influential alliances with countries that are important to American foreign policy strategy.** To help our domestic industry adapt to the realities of today's market and regain global leadership, the U.S. needs a new policy strategy.

Energy is specifically key

Hale 02 (Hale, Cameron Edward (The University of Wisconsin - Madison). 2002, "Energy and hegemonic power", Ads, https://ui.adsabs.harvard.edu/abs/2002PhDT.......127H/abstract, DOA 3/11/25) RK

Current theories of hegemony have, for the most part, ignored energy as a factor. It is argued here, however, that **there are three reasons to expect energy to be a factor in the rise of nations to hegemonic power. First, societies require flow-throughs of energy, material, and information in order to maintain themselves, grow, and develop. Second, the types of energy systems used by a society set somewhat predictable limits on what humans can do and on how they will be organized. And third, since different energy sources and their associated technologies exhibit different capabilities and limitations, advantages may be conferred on one society over another based on the energy sources used by those societies. Case studies of the economic, military, and energy systems of the four nations that have achieved hegemony---Portugal, the Netherlands, the United Kingdom, and the United States---found that changes in energy systems were a significant factor in each instance of hegemony.** Also examined was the premise that the rise and decline of hegemonic powers may reflect the movement away from, and subsequent return to, a condition of steady-state---where a society's energy systems, and those parts of the society that respond to changes in energy factors, change very slowly over time. It was postulated that an extended period of stable energy conditions in conjunction with the diffusion of technology would erode any energy-based differences in power among nations. While, on the other hand, the movement away from a condition of steady-state brought on by changes in a society's energy systems might provide that society with enough advantages that it could seek hegemony. Evidence for an association between the movement from one steady-state to another and the rise and decline of hegemony was found in only two of the four cases.

The impact is Chinese power

China's rise will cause conflict

Kim 19(Min-Hyung Kim, Department of Political Science and International Relations, Kyung Hee University, Seoul, South Korea, 2-4-2019, "A real driver of US–China trade conflict: The Sino–US competition for global hegemony and its implications for the future," No Publication, https://www.emerald.com/insight/content/doi/10.1108/ITPD-02-2019-003/full/html, DOA: 4-7-2022)ET

US hegemony over the last seven decades or so has recently been challenged by China's rise. Since the economic reforms launched in December 1978, China has achieved a remarkable economic development. China's real-Gross Domestic Product (GDP) growth rate over the last four decades is about 10 percent on average (World Bank, 2018; also see Kim, 2016b, p. 707). While the size of China's economy (in terms of GDP) is currently the number two in the world only after the USA, China already became the world's largest exporter in 2010. In 2011, China ranked as the world's first destination for inward foreign direct investment (FDI) and the world's first investor for outward FDI among developing countries[4]. Also, in 2013, China became the world's largest trading country in goods, overtaking the USA (Anderlini and Hornby, 2014). Moreover, measured on a purchasing power parity basis that adjusts for price differences, China ranked in 2017 as the world's number one (Central Intelligence Agency, 2018). Given that China's size of GDP on a PPP basis in 1980 was one-tenth that of the USA, China's economic growth is truly remarkable (International Monetary Fund, 2018). **China's rapid ascendance as an alternative hegemonic power poses a significant challenge to US hegemony in the world.** As a matter of fact, competing with the USA in many areas, China has quickly strengthened its economic, technological and military power and as a consequence has started to threaten US global hegemony. Accordingly, many scholars now often talk about a declining US hegemony and a forthcoming Chinese hegemony (see, for instance, Layne 2018, 2012). Some of them even predict a hegemonic war between the USA and China during the hegemonic transition period (see, e.g., Liff and Ikenberry, 2014; Mearsheimer, 2014; Friedberg, 2005). Underlying these arguments for an inevitable war between the two superpowers is PTT. PTT originally formulated by Organski (1958) posits that war is likely when the power of the dominant state in the international system (i.e. hegemon) is declining and that a dissatisfied rising challenger substantially reduces the power gap between the hegemon and itself. Unlike balance of power theory, PTT argues that the war is most likely when there is near power parity between a dominant state and a rising and dissatisfied challenger (Organski and Kugler, 1980, pp. 19-20)[5]. A rising power here is generally dissatisfied with the existing international order and initiates war against a declining hegemon in order to impose orders that are more favorable to itself (Organski 1958, pp. 364-367). Layne (2018, p. 110) put these power transition dynamics quite succinctly as follows: "Over time, however, the relative power of states changes, and eventually the international order no longer reflects the actual distribution of power between or among the leading Great Powers. When that happens, the legitimacy of the prevailing order is called into question, and it will be challenged by the rising power(s)." And when the balance of power between a dominant state and a rising challenger changes sufficiently, a new order replaces an old one typically by a hegemonic war (2018, p. 104). Paying close attention to the growing Sino–US competition over hegemony in the twenty-first century, therefore, Shirk (2007, p. 4), China specialist, argues that "History teaches us that rising powers are likely to provoke war." **On the other hand, scholars like Gilpin (1981) contend that the power transition war between great powers is likely to occur when a hegemonic state whose power is declining due to imperial overstretch[6] views "preventive war as the most attractive means of eliminating the threat posed by challengers"** (Ned Lebow and Valentino, 2009, p. 391), although they do acknowledge that there might be some "ways to prolong the period of its power preponderance vis-à-vis the rising challenger, so that the rapidly rising power will not dare to challenge the hegemonic leadership" (Kim and Gates, 2015, p. 221). **In this case, the initiator of war is a declining hegemon, rather than a rising challenger. The declining hegemon who fears a rising challenger's overtaking its power in the near future sees war as a better option than other options of maintaining its hegemony such as reducing its commitments abroad and appeasing a rising challenger.** In light of the power transition perspective, **the three most recent examples of China's challenges to US hegemony in the world are the Belt and Road Initiative (BRI), the creation of the AIIB, and Beijing's plan for "Made in China 2025."** First of all, China's BRI, which is also called the "One Belt, One Road" Initiative or the Initiative of "the Silk Road Economic Belt and the 21st-Century Maritime Silk Road," is Chinese President Xi Jinping's signature project. The BRI was first announced in 2013 when Xi visited Central and Southeast Asia. It seeks to connect Asia, Africa and Europe to promote regional economic cooperation, infrastructure construction, and world peace. It was motivated by "the Silk Road Spirit" (i.e. peace and cooperation, openness and inclusiveness, mutual learning and mutual benefit) of more than two millennia ago that is, China claims, "a historic and cultural heritage shared by all countries around the world" (The State Council of the Republic of China, 2015). According to the "Action Plan on the Belt and Road Initiative" published jointly by the National Development and Reform Commission, the Ministry of Foreign Affairs, and the Ministry of Commerce (MOFCOM), accelerating the construction of the BRI "can help promote the economic prosperity of the countries along the Belt and Road and regional economic cooperation, strengthen exchanges and mutual learning between different civilizations, and promote world peace and development" (The State Council of the Republic of China, 2015). Hence, Beijing contends that BRI "is a great undertaking that will benefit people around the world" (The State Council of the Republic of China, 2015). The BRI currently includes about 70 countries that accounts for 70 percent of the world's population, 55 percent of the world's Gross National Product and 75 percent of global energy reserves (Cavanna, 2018). Many countries in the world (e.g. "from Panama to Madagascar, South Africa to New Zealand" (Kuo and Kommenda, 2018)) have officially pledged support for the BRI. Second, the AIIB is a China-led multilateral development bank, which was originally launched by Chinese President Xi in 2003. Among others, Beijing's frustration with the slow reform process of economic governance in the aftermath of the global financial crisis in 2008, its intention to popularize the Renminbi (China's currency) as a global reserve currency, and its hope to increase its voice in global financial institutions were the important motivations of the creation of the AIIB. With $100bn of initial capital, the AIIB, headquartered in Beijing, officially came into operation in January 2016. The stated main goal of the AIIB was to "improve social and economic outcomes in Asia" (AIIB, 2018a) by providing finance to the various infrastructure projects of the region's developing countries. Beijing claims that AIIB-funded projects will better connect people, markets and services to promote sustainable growth, development, and prosperity (AIIB, 2018b). Along with the New Development Bank (NDB),[7] which is formally called the BRICS (Brazil, Russia, India, China, South Africa) Development Bank headquartered in Shanghai, and Chinese lending institutions such as the Silk Road Fund and Chinese policy banks, the launch of the AIIB represents China's major financial initiatives that could rival US-led multilateral institutions. As of October 2018, the AIIB has 87 approved members (68 members and 19 prospective members) around the world and its total investment amounts up to $6.4bn. As Tekdal (2017, p. 375) notes, although the AIIB has no official link to the BRI, a primary motivation of its creation was to fund projects in BRI partner countries. As an emerging economic hegemon, which is dissatisfied with the global economic governance in which its voting share in the existing multilateral institutions like the IMF, the World Bank, the Asian Development Bank does not match its economic power as the world's second largest economy and the world's biggest trading nation, China's initiatives of the BRI, the AIIB and the NDB demonstrate its long-term goal of reshaping the global economic order. Third, "Made in China 2025" is Beijing's ten-year industrial development plan. First, announced and approved by China's State Council in 2015, it is "a blueprint for Beijing's plan to transform the country into a high-tech powerhouse that dominates advanced industries like robotics, advanced information technology, aviation, and new energy vehicles" (Laskai , 2018). By enhancing Chinese industries' competitiveness and innovation and reducing China's dependence on foreign technology through achieving 40 percent of domestically manufactured basic components and basic materials by 2020 and 70 percent of self-sufficiency in core components and basic materials in industries like aerospace equipment and telecommunication equipment by 2025 (Morrison, 2018, p. 47; Laskai, 2018), its goal is to make China a manufacturing superpower that dominates the world market in future high-tech industries. Indeed, while the term "Made in China" has typically meant cheap products such as clothing, shoes and consumer electronics with low quality, "Made in China 2025" intends to turn China into an independent and cutting-edge technology-driven economy. Beijing believes that by moving toward higher value-added high-tech industries, they could escape the so-called "middle-income trap that has plagued many developing countries" (Hopewell, 2018) with the problems of increased wages and low productivity. China's initiatives of the BRI, the AIIB and Made in China 2025 certainly threaten the global hegemony of the USA, which is now over seven decades. Layne (2018, p. 96) points out that "Since the onset of the Great Recession,[8] China has successively taken top position in the world in exports (passing Germany); in trade (passing the USA); and in manufacturing (claiming a title the USA had held for a century)." Based on these facts, he argues that the **Great Recession and the rapid rise of China as a leading economic power have demonstrated the reality of American decline – i.e. the end of the unipolar era or Pax Americana**[9] (Layne, 2012, p. 204). **Although China repeatedly claims that it does not seek to replace US hegemony in the world, its behavior revealed by the initiatives of the BRI, the AIIB and Made in China 2015 illustrates that its ultimate goal is to be a global hegemon**[10]. This is not surprising because all the rising powers in history invariably sought to first dominate the region they are situated (Mearsheimer, 2011, 2014) and expand their power globally (Gilpin, 1981). **Given that "It is more difficult for the leaders of a declining hegemon to accept the reality or prospect of their country's diminished influence and status"** (Chan, 2008, p. 50), **the USA has every reason to prolong its hegemony in the post-1945 world, which has served its own interests** (Layne, 2018, p. 105). **These efforts to maintain US hegemony are well observed in the case of American actions against China's initiatives of the BRI, the AIIB and Made in China 2015.** First of all, **despite China's claim that the BRI aims to promote world peace and development, many analysts in Washington view it as a Chinese version of Marshall Plan that seeks to boost Chinese investment around the world for global dominance**. **They think that as "a top-level design for which the central government has mobilized the country's political, diplomatic, intellectual, economic and financial resources"** (Rolland, 2018), the BRI is Beijing's "attempt to remake global commerce on China's terms and project Chinese power far and wide" (Chellaney, 2018). **As the BRI expands in scope, it could give China too much leverage and control over other countries, especially those that are small and poor** (Kuo and Kommenda, 2018). Also, by making China a major hub of global investment, trade, and finance, the BRI contributes to build a Chinese version of hub-and-spoke network system. **Thus, Harry Harris, head of US Pacific Command Admiral, argued in early 2018 that the BRI is "a concerted, strategic endeavor by China to gain a foothold and displace the USA and our allies and partners in the region"** (Harris, 2018). Moreover, given "almost all the ports and other transport infrastructure being built can be dual-use for commercial and military purposes" the BRI is regarded not simply as China's plan to build roads and railways across Eurasia and Africa or the Indo-Pacific, but as Beijing's grand strategy for the next decades and its vehicle to write new rules that reflect Chinese interests (Kuo and Kommenda, 2018). Indeed, Beijing has made a link between the BRI and the concept of China's core national security interests. For example, Wei Fendge, China's Defense Minister, told Pakistan's Navy chief in 2018 that "China was ready to provide security guarantees for the One Belt, One Road project" (Smith, 2018). Therefore, Eisenman contends that with no exact definition of its scope and contents, the BRI is China's attempt to "create a new Sinocentric era of globalization using both traditional tools of Chinese statecraft as well as new types of economic incentives and debt financing arrangements" (Eisenman, 2018). In other words, the BRI reflects China's increasing relative power in the world as well as growing Beijing's ambitions to shape global economic governance (Tekdal, 2017, p. 378). It "exemplifies how China is flaunting its global ambitions" (Chellaney, 2018). As the BRI is increasingly seen as a major source of China's political and economic influence of the world, US policy makers have expressed their concerns[11] and have begun to take some measures against it. For example, the USA, along with Japan and India, have discussed trilateral efforts to foster infrastructure development in the Indo-Pacific region since 2015. In particular, the Trump Administration has sought to create a development finance mechanism, which is designed to counter the negative effects of the BRI. It has also begun to explore ways to become more proactive in promoting regional connectivity and infrastructure initiatives in partnership with Japan. Moreover, reviving their Quadrilateral Strategic Dialogue in November 2017, the USA, together with Japan, Australia and India, discussed not only the need to foster a new vision for regional infrastructure but also the need to further support the Asian Development Bank and the World Bank in order to enhance lending for infrastructure projects in the region. Furthermore, the joint statement released after the meeting between the US President Trump and India's Prime Minister Modi at the White House in June 2017 made it clear that the two countries agreed to promote a vision for regional ties by strengthening "regional economic connectivity through the transparent development of infrastructure and the use of responsible debt financing practices, while ensuring respect for sovereignty and territorial integrity, the rule of law, and the environment" (The White House, 2017). This is, in fact, an announcement by the leaders of the two countries of the vision, which is completely at odds with the BRI. In addition, drawing careful attention to the "neo-colonialist characteristics"[12] of the BRI, the US–Japan Business Council and the US–India Business Council jointly launched in May 2018 a new private-sector initiative, called the Indo-Pacific Infrastructure Trilateral Forum, which aims to insulate sovereign states from external coercion, support good governance and liberty, promote market-based economics, and help support quality and sustainable infrastructure development in the Indo-Pacific region (Smith, 2018). **Likewise, the USA sought hard to prevent the creation of the AIIB.** Despite its stated goal of helping to finance the various infrastructure projects of the developing countries in Asia, the USA viewed the AIIB as China's efforts to weaken existing financial institutions such as the World Bank, the IMF and the Asian Development Bank, which are largely under the influence of the USA and its close ally, Japan (Kim, 2018, p. 618; Kim, 2016c, p. 69). Hence, the USA strongly lobbied against the creation of the AIIB. Washington even pressured its allies not to agree to the AIIB's creation. Although US opposition to the AIIB was reportedly due to US doubts that the AIIB would stick to the same level of transparency and governance structure as the IMF, the World Bank and the Asian Development Bank, the real reason was Washington's concerns about the shifting balance of power between the USA and China (Layne, 2018, p. 103). In any case, US efforts to prevent a China-led financial institution in Asia miserably failed. Indeed, despite USA's strong resistance and pressures, the AIIB was successfully launched and most US allies except Japan (e.g. Germany, Great Britain, France, Italy, Australia, Israel, South Korea, etc.) joined the AIIB as its founding members. In total, 57 countries all over the world participated in the AIIB as its founding members. After all, China's ability to attract widespread support for the creation of the AIIB was seen by Washington as a significant threat to America's global economic leadership (Layne, 2018, p. 102). By showing that Washington was not able to keep its allies onside in the face of Beijing's growing power, the establishment of the AIIB illustrated that US economic power in the world is declining whereas China's economic influence is increasing. To some observers, China's AIIB initiative and US failure to prevent its creation signaled that "the Sino-American balance of power now is tilting towards Beijing" (Layne, 2018, p. 103). **By the same token, Washington views China's initiative of "Made in China 2015" as a very serious challenge to US hegemony in the world. Since Made in China 2015 calls for achieving China's self-sufficiency through technology substitution and aims to transform China into a high-tech powerhouse that dominates advanced industries, the USA views it as a real threat to US technological leadership in the world** (Laskai, 2018). According to the US President Trump, the Made in China 2025 program unfairly disadvantages US companies because it involves Chinese government's subsidies and heavy investments in innovation and research as well as Beijing's policies to promote the forced technology transfer of US companies in exchange for obtaining access to the lucrative Chinese market (Hopewell, 2018). Therefore, he contends that "Made in China 2025" must be stopped (Landler, 2018). Although the Trump Administration's policy of imposing tariffs on foreign steel affects not only China but also US allies like South Korea, its main goal is to fight China's industrial policy in high-tech manufacturing sectors such as artificial intelligence, aerospace, robotics, and energy-saving vehicles. As China's persistent economic growth brings it into direct competition with the USA, Trump has explicitly stated that the proposed US tariffs are indeed designed to impede the program of Made in China 2025 (Hopewell, 2018). Seen from Beijing, this sort of US policy appears as if Washington aimed to "prevent China (from) moving into the industries of the future so as to ensure continued American dominance of the most profitable sectors of the global economy, and the most strategically-significant technologies" (Rachman, 2018). Given that China is the most serious competitor to the USA in the twenty-first century, the contest over future industries and technologies underscores the fact that the Sino–US trade rivalry has important strategic implications (Rachman, 2018). **Since the end of the Second World War, the USA has undoubtedly been a global hegemon. With its preponderant military and economic strength, it has**

created a liberal international economic order and maintained it by promoting global free trade. USA sudden turn to protectionism under the banner of "America First" in the Trump administration illustrates **"US fear" that its hegemony or Pax Americana is declining vis-à-vis China's growing power. It also demonstrates that the USA now seeks to deter China from overtaking its hegemony so as to keep US hegemony as long as possible.** Currently, the USA and China are waging a trade war. What is important to note here is that the driving force of the trade war between the world's two largest economies is more political than economic. That is to say**, as China's economic and political influence in the world vis-à-vis that of the USA increases, US fear about China's power also grows. Under these circumstances, Washington makes every effort to assert its global dominance by deterring China's challenge to its hegemony[13]. It is this sort of "US fear" about hegemonic power transition from Washington to Beijing that brought about US policies against the BRI, the AIIB, and Made in China 2015. The fear of hegemonic power transition is indeed a driving force for the US-launched trade war.** Understood this way**, the trade war between the USA and China may be a harbinger of a much larger-scale conflict between the two parties, since as PTT predicts, war is more likely to occur when the power gap between a declining hegemon and a rising challenger is getting closed. As China's economic, technological, military and political rise continues down the road, the USA will try to contain it in order to maintain its global hegemony. The obvious consequence of this seesaw game is the intensification of the Sino–US competition over global hegemony. The USA and China, the two most powerful states in the world, appear as if they were on a collision course. What this means is that so long as US fear about China's overtaking US hegemony persists, a similar type of conflict between the two hegemonic powers is likely to occur in the future even if the current trade war is over.**

This goes nuclear

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China is a different country today than it was in the time of Mao Zedong, and its arsenal is now better developed, which should induce caution in efforts to discern lessons from the earlier era. Nevertheless, this episode highlights several points with enduring relevance regarding the nuclear implications of conventional wars. China initiated a war in which it believed nuclear weapons would be irrelevant, despite the vast nuclear asymmetry between itself and its opponent. China then radically updated its assessment of the possibility of nuclear [End Page 89] attack to a degree bordering on paranoia once the conventional war did not go as expected. Everything the Soviets did—even sending representatives to negotiate, or not launching a nuclear strike on a day that the Chinese expected it—only fed the narrative among Chinese leaders that a nuclear attack was imminent, even though archival evidence now suggests that the Soviets never intended to follow through on their threat.132 Most worryingly, China prepared to use its nuclear weapons, even though it had to expect devastating retaliation and that merely the preparations to launch raised serious risks of accidental or unauthorized use. Fortunately, China's fears in this case eventually led it to de-escalate the crisis. It is an open question whether a similarly uneventful denouement would occur today in the event of a much larger-scale conventional war involving actual destruction of components of the country's nuclear arsenal and stakes radically more significant than uninhabited islands in the Ussuri River. //// Conclusion **Chinese nuclear escalation in the event of a conventional war with the United States is a significant risk,** although for reasons not fully surfaced in the existing debate. A U.S. conventional campaign would indeed pose a large, though not total, threat to China's nuclear arsenal. More important than the purely military-technical implications of the U.S. campaign, however, is what China is likely to believe the campaign signals about U.S. intentions in a world where conventional deterrence has just failed. **Reasonable Chinese fears that the United States might be attempting conventional counterforce, or considering or preparing for nuclear counterforce, could lead China to engage in limited nuclear escalation to gain military advantage or coercive leverage**—**despite China's no-first-use policy.**

Causes extinction

Starr 14 (Steven Starr: Director, Clinical Laboratory Science Program at the U of Missouri. Senior scientist for Physicians for Social Responsibility. 5/30/14, "The Lethality of Nuclear Weapons: Nuclear War has No Winner", Centre for Research on Globalization, http://www.globalresearch.ca/the-lethality-of-nuclear-weapons-nuclear-war-has-no-winner/5385611 // DOA: 4/1/21)JDE

Paul Craig Roberts held top security clearances. He has repeatedly warned that a US-Russian nuclear war would wipe out the human race, along with all other complex forms of life. As a scientist with expert knowledge, I wish to echo and explain his warning.//// **Nuclear war has no winner**. Beginning in 2006, several of the world's leading climatologists (at Rutgers, UCLA, John Hopkins University, and the University of Colorado-Boulder) published a series of studies that evaluated the long-term environmental consequences of a nuclear war, including baseline scenarios fought with merely 1% of the explosive power in the US and/or Russian launch-ready nuclear arsenals. They concluded that **the consequences of even a "small" nuclear war would include catastrophic disruptions of global climate**[i] **and massive destruction of Earth's protective ozone layer**[ii]. These and more recent studies predict that **global agriculture would be so negatively affected by such a war, a global famine would result, which would cause up to 2 billion people to starve to death**. [iii]//// These peer-reviewed studies – which were analyzed by the best scientists in the world and found to be without error – also predict that **a war fought with less than half of US or Russian strategic nuclear weapons would destroy the human race**.[iv] In other words, a US-**Russian nuclear war would create such extreme long-term damage to the global environment that it would leave the Earth uninhabitable for humans and most animal forms of life**.//// A recent article in the Bulletin of the Atomic Scientists, "Self-assured destruction: The climate impacts of nuclear war",[v] begins by stating://// "A nuclear war between Russia and the United States, even after the arsenal reductions planned under New START, could produce a nuclear winter. Hence, **an attack by either side could be suicidal, resulting in self-assured destruction**." In 2009, I wrote an article[vi] for the International Commission on Nuclear Non-proliferation and Disarmament that summarizes the findings of these studies. It explains that **nuclear firestorms would produce millions of tons of smoke, which would rise above cloud level and form a global stratospheric smoke layer that would rapidly encircle the Earth. The smoke layer would remain for at least a decade, and it would act to destroy the protective ozone layer** (vastly increasing the UV-B reaching Earth[vii]) as well as block warming sunlight, thus creating Ice Age weather conditions that would last 10 years or longer.//// Following a US-Russian nuclear war, **temperatures in the central US and Eurasia would fall below freezing every day for one to three years; the intense cold would completely eliminate growing seasons for a decade or longer. No crops could be grown, leading to a famine that would kill most humans and large animal populations.//// Electromagnetic pulse from high-altitude nuclear detonations would destroy the integrated circuits in all modern electronic devices**[viii], including **those in commercial nuclear power plants. Every nuclear reactor would almost instantly meltdown; every nuclear spent fuel pool** (which contain many times more radioactivity than found in the reactors) **would boil-off, releasing vast amounts of long-lived radioactivity. The fallout would make most of the US and Europe uninhabitable. Of course, the survivors of the nuclear war would be starving to death anyway**.////

C2) Food

Farmland declining substantially

Zulauf et al 24 (Carl Zulauf: Department of Agricultural, Environmental and Development Economics, Ohio State University. Gary Schnitkey, Jonathan Coppess and Nick Paulson: Department of Agricultural and Consumer Economics, .University of Illinois. 9/18/24, "Loss of US Farmland in the 21st Century: The

National Perspective from the Census of Agriculture", farmdoc daily, https://farmdocdaily.illinois.edu/2024/09/loss-of-us-farmland-in-the-21st-century-the-national-perspective-from-the-census-of-agriculture.html // DOA: 3/27/25)JDE

One of the widely-watched variables tracked by the US Census of Agriculture is land in farms. This article is the first of two that examines changes in land in US farms between the Agricultural Censuses of 1997 and 2022. This quarter-century period is of interest because the 1996 Farm Bill enacted a fundamental change to US farm policy by eliminating acreage set aside programs that in various forms had existed since modern US farm support policy began in 1933, thus giving farmers, with a few exceptions, the freedom to decide what crops to plant and not plant**. Since this seminal change in US farm policy, land in US farms has declined by 74.7 million acres or -8%. By far, pastureland declined the most, accounting for 88% of the total decline. The other two major farmland categories also declined: woodland by -6% and cropland by -2%.** Land in Farms The 1997 Agricultural Census reported 955 million acres of land in US farms (see Figure 1). Cropland, defined as harvested plus abandoned and failed farmland, accounted for 34% of these acres, with woodland accounting for 8% and pastureland for 52%. These three categories totaled 94% of all land in US farms in 1997. Acre Change from 1997 to 2022 The 2022 Agricultural Census reported 880 million acres of land in US farms, or 75 million fewer acres than the 1997 Agricultural Census (see Figure 2). **Cropland and woodland declined by roughly -5 million acres while pastureland declined by -65 million acres**. Pastureland accounted for 88% of the total decline. Definitions are nearly identical between 1997 and 2022 (see Data Note 1). Therefore, a change in definition is not explaining the decline of land in US farms. Percent Change from 1997 to 2022 Since the number of acres varies substantially by land use category, it is important to also look at percent change in acres. **There were 8% fewer acres of land in US farms in 2022 than in 1997** (see Figure 3). Pastureland had the largest percent loss, -13%. Percent decline was roughly half as large for woodland, -6%; but only -2% for cropland. As a result of these differential percent changes between 1997 and 2022, cropland's share of land in farms increased from 34% to 36% while pastureland's share declined from 52% to 49%.

And insecurity is increasing

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Food insecurity increased in 2023, from 12.8 percent in 2022 to 13.5 percent in 2023, the U.S. Department of Agriculture's (USDA) latest food insecurity report finds. Food insecurity has risen two years in a row, reversing a downward trend; food insecurity rates had fallen to a two-decade low in 2021, when significant relief measures, such as expanded food assistance benefits and an expanded Child Tax Credit, were in place in response to the COVID-19 pandemic. The rise in food hardship shows that Congress should protect and improve upon policies that help families afford a healthy diet. **In 2023, 33.6 million adults and 13.8 million children lived in food-insecure households, compared to 30.8 million adults and 13.4 million children in 2022. More households had difficulty acquiring food due to lack of resources**, as they experienced the impact of the expiration of pandemic-related benefits and high food prices in 2023.

Aff is key for two reasons

First, saving farmland

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U.S. Senators Jon Tester (D-MT) and Mike Rounds (R-SD) recently introduced a bill to bar foreign adversaries—namely, China, Iran, North Korea, and Russia—from buying American farmland. The act was triggered by concerns over Chinese investment in U.S. farmland, although China currently owns less than 1 percent of U.S. foreign-held farmland (Canadian investors hold the largest share -nearly one third - of U.S. foreign-held farmland). Preventing adversaries from investing in U.S. farmland is a necessary but insufficient action. **As the United States progresses with its net-zero transition, the public and private sectors should maximize land efficiency for renewable energy sources. If not appropriately managed, electricity production from renewables to meet decarbonization goals could drive up land use and land-cover change, threatening biodiversity and food security and challenging other environmental and social priorities.** According to Bloomberg, the United States currently uses eighty-one million acres to power its economy, about the size of Iowa and Missouri combined and covering roughly 4 percent of the contiguous United States. If **the U.S. government and energy industry fail to maximize land efficiency in the energy transition process, replacing less land-intensive fossil fuels with more land intensive clean energy sources will dramatically drive up demand for land. Intensified competition for land use risks exacerbating farmland loss.** For example, according to a 2020 Brookings report, electricity generation by wind and solar is at least ten times more land-intensive than coal- or natural gas-fired power plants. A different study, using data from 1,400 real-world observations covering nine electricity sources across 73 countries and 45 U.S. states, also showed that wind and solar are far more land intensive than fossil fuels, and biomass is the least land-efficient source of electricity. To achieve President Joe Biden's pledge to create a carbon-free economy by 2050**, the United States would need the equivalent of four additional South Dakotas to generate sufficient clean power to meet its electricity demand**, according to Princeton University estimates and Bloomberg analysis. The Biden administration has demonstrated a firm commitment to promoting clean energy development in the United States through landmark legislation, such as the infrastructure bill and the Inflation Reduction Act. Policy measures such as subsidies and tax credits make it more lucrative for owners of farms and ranches to lease their land for solar and wind farms in exchange for annual royalty payments. In parts of the country, such as Colorado, solar and wind farms have become the new cash crop, driving a frenzied land rush for renewable energy that has irrevocably altered the landscape. Converting prime agricultural land into clean energy farms has also raised significant concerns and encountered local resistance in rural communities in states such as Texas. **The United States needs a more land-efficient approach. That will require restoring American leadership in nuclear power research, development, and deployment. Researchers have found that nuclear power is by far the most land efficient for electricity generation compared to other energy sources: to generate the same amount of electricity, it needs twenty-seven times less land than coal, eighteen times less than hydropower plants, and thirty-four times less than solar. However, developing nuclear energy has not been a priority in the U.S. energy agenda for decades**. Between 2013 and 2021, at least twelve [PDF] U.S. nuclear reactors were shut down (representing 9,436 megawatts of electricity generation capacity) due to rising security costs, competition from wind and solar, and power generated by cheap natural gas, leaving just 92 nuclear reactors operating nationwide. Not until the recent disruption in global energy markets triggered by Russia's invasion of Ukraine did the U.S. government step up support for its nuclear energy sector. The Biden administration has correctly recognized that maintaining and expanding nuclear power as a source of carbon-free electricity is crucial for reaching its climate commitment. To that end, the Biden administration recently offered $1.2 billion in aid to extend the life of distressed nuclear power plants. The funding is also available for recently closed plants, marking the first time such support has become available. The challenges of the energy transition to a clean and sustainable future extend beyond monetary costs. **The transition requires careful consideration of land use intensity between competing interests and demands. The U.S. government needs to revitalize the domestic nuclear power industry to drive the decarbonized American economy while protecting farmland and food security.**

Nuke energy is best for land conservation

Brook and Bradshaw 14 (Barry W. Brook The Environment Institute and School of Earth and Environmental Sciences, The University of Adelaide, Adelaide, South Australia, 5005 Australia. Corey J. A. Bradshaw The Environment Institute and School of Earth and Environmental Sciences, The University of Adelaide, Adelaide, South Australia, 5005 Australia. Dec 9 2014, “Key role for nuclear energy in global biodiversity conservation”, Society for Conservation Biology, https://conbio.onlinelibrary.wiley.com/doi/10.1111/cobi.12433, DOA 3/10/25) RK

Future of Energy Production **Fossil fuels have supplied most of society's energy demand since the Industrial Revolution. Yet with the mounting problems of climate change, pollution, security, and dwindling supplies, we now face the need for a near-total transformation of the world's energy systems**. We have provided a short critical overview of the challenges and trade-offs in—and **potential solutions for**—**completely decarbonizing our energy supplies while meeting the growing need for increased prosperity** in the developing world. **Of the limited options available, next-generation nuclear power and related technologies, based on modular systems with full fuel recycling and inherent safety, hold substantial yet largely unrecognized prospects for being a principal cure for our fossil-fuel addiction, yet nuclear power still has an undeservedly poor reputation in the environmental community. Solving the energy problem** has broader implications: it **will not only help mitigate climate change, it will also avoid destructive use of natural and agricultural landscapes for biofuels and diffuse energy generation and thus allow societies to reduce their environmental footprint by sparing land and resources for biodiversity conservation**. Based on an objective and transparent analysis of our sustainable energy choices, we have come to the evidence-based conclusion that **nuclear energy is a good option for biodiversity conservation (and society in general)** and that other alternatives to fossil fuels should be subjected to the same cost–benefit analyses (in terms of biodiversity and climate outcomes, as well as sociopolitical imperatives) before accepting or dismissing them. We conclude that **large-scale nuclear power—as a route to an electrified, oil-, gas- and coal-free economy—offers a positive way forward because it provides a low-risk pathway to eliminating the fossil-fuel dependencies, global energy poverty, and wealth imbalances that rank among the major forces driving today's biodiversity crisis. At the very least, nuclear power needs to be considered seriously, alongside renewable sources of energy such as wind and solar power, in any robust sustainable energy mix for the future.**

Second, nuclear technologies

Radiation solves food insecurity

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Nuclear science and technology play a key role in helping improve global access to a safe, secure, and high-quality food supply. Scientists and farmers are continually developing new ways to cultivate crops and raise livestock using nuclear technologies—technologies which have been proven safe and effective. When it comes to agriculture, **nuclear techniques can make an exponential difference before seeds are even planted. One such technique facilitates the breeding of hardier plant varieties. This is done by exposing them to radiation and selecting mutations that make them more likely to survive and flourish; for example, by better withstanding drought conditions or providing higher levels of nutrition. These plants have been proven to be completely safe and free from lingering radiation. In Indonesia, for example, more than 35 new varieties of crops, including soybeans and rice, have been modified to produce more yield, even when they are grown in unfavorable climates. Higher quality crops and produce—like the popular Rio Red grapefruit**, which was produced by the Texas A&M University Citrus Center—**can also be developed using radiation-induced plant breeding.** IAEA fellows from different countries in training under the guidance of the IAEA Plant Breeding Unit at Seibersdorf, Austria. (Photo: D.Calma/IAEA) **Once crops start to grow, farmers use other techniques to maximize their yield. For example, tracing isotopes in water, fertilizer, and soil can reveal whether these resources are being used efficiently rather than lost to the environment, such as through runoff or evaporation. In Kenya, farmers successfully converted to drip irrigation after analyzing water use efficiency with such nuclear techniques, thereby reducing the amount of water needed to produce their crops. Sometimes, nuclear techniques aren't about improving growth, but about stopping the growth of harmful organisms**. The radiation-based Sterile Insect Technique helps reduce populations of pests that damage crops or livestock. **In Mexico, the Moscafrut Fruit Fly Facility produces hundreds of millions of sterile fruit flies each week by irradiating them and then releasing the sterile flies into local citrus and mango crops. There, the sterile flies mate with local pests, thus reducing the number of future offspring.** Similarly, in the Western Cape of South Africa, sterilized false codling moths are introduced, reducing the amount of damage these pests inflict on citrus production. **This same Sterile Insect Technique can also be used to reduce other pests, such as mosquitos and tsetse flies, that plague livestock.** Maasia pastoralists preparing their maize harvest in Narok, Kenya. (Photo: Ami Vitale/FAO) **Even after crops are harvested, nuclear science and technology have a key role in improving food abundance and quality. For years, food irradiation has been used to improve food safety and increase the shelf life of produce. It does so by killing microorganisms and pests that cause illness and rot, all without leaving any residual radiation behind.** Meanwhile, analyzing the isotope composition of produce can authenticate a product's origin and prevent food fraud, especially when it comes to highly valued foods, like regional coffee. Similarly, watered-down or polluted foods, such as fresh vegetable oil that has been mixed with reused vegetable oil, can be monitored by measuring the isotope composition. There are other ways nuclear science and technology help protect animal livestock. For example, the Food and Agriculture Organization and International Atomic Energy Agency partnered to establish a network of veterinary laboratories, called VETLAB, composed of labs across Asia and Africa. **VETLAB identifies and tracks the spread of diseases that threaten livestock using nuclear-derived diagnostic techniques, thus**

helping farmers contain these diseases as soon as possible. Nuclear-derived techniques are also used to validate vaccines that are used to combat animal disease. Oceans serve as another vital source of food, and, just as in agriculture, nuclear science and technology can help ensure that the bountiful supply of food provided by the oceans is high-quality and safe to consume. Nuclear techniques are also used to identify the extent and sources of pollution, thereby enabling better protection of critical feeding grounds for fish. Nuclear science and technology can and do play a key role in providing humanity with safer, higher quality, and more bountiful food. Through these techniques and many others, nuclear science and technology can and do play a key role in providing humanity with safer, higher quality, and more bountiful food. Access to these important tools is facilitated by the Nuclear Non-Proliferation Treaty (NPT). Parties to the Treaty have access to these technologies through the International Atomic Energy Agency (IAEA), which serves as a leader in the development and delivery of several of these nuclear applications. The United States is proud to help IAEA Member States address food security issues through increased access to nuclear technologies and has contributed more than $132 million through the IAEA's Peaceful Uses Initiative (PUI) since it was first established in 2010. **Through further collaboration, and thanks to innovations in nuclear science and technology, we can all do our part to fight hunger across the globe.**

This relies on the aff

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Nuclear power comes from the energy that is released in the process of nuclear fission. Most nuclear power plants use enriched uranium as their fuel to produce electricity. This fuel contains greater amounts of a certain kind (or isotope) of uranium known as U-235. Its atoms are more easily split apart in nuclear reactors. **In fission, the nuclear fuel is placed in a nuclear reactor core and the atoms making up the fuel are broken into pieces, releasing energy. The neutrons that are released by one atomic fission go on to fission other nuclei, triggering a chain reaction that produces heat, radiation, and radioactive waste products.**

The impact is food wars

Lack of Ag land preservation poses an existential risk to US agriculture and society

Freedgood et al 20 Julia Freedgood, Mitch Hunter, Jennifer Dempsey, Ann Sorenson 2020, "Farms Under Threat: The State of the States," American Farmland Trust, 2020, https://s30428.pcdn.co/wp-content/uploads/sites/2/2020/09/AFT_FUT_StateoftheStates_rev.pdf // DOA 7/3/2022 BRP

American farmland provides food security, economic prosperity, and environmental quality. Yet all of these benefits are threatened by 21st century trends, including poorly planned development, weakening agricultural viability, an aging farm population, and climate change. On their own, each of these threats is troubling; together they point to the need for immediate public action. Food Security Food is affordable to most people in the United States, ranking third behind housing and transportation in typical household expenditures.34 Indeed, in 2018, Americans spent less than 10 percent of their disposable incomes on food.35 Still 11.1 percent (14.3 million) of U.S. households were food insecure in 2018 and households with children had a substantially higher rate of food insecurity (13.9 percent) than those without.36 Poorly planned housing, energy, and transportation development threaten to destroy the land we use to grow our food—especially fruits, vegetables, and nuts. Yet while agriculture faces increasing pressures and challenges, consumers' expectations for plentiful, high-quality food are increasing. This includes demand for environmentally, ethically, and locally sourced products identified as humane, ecologically friendly, fair trade, organic, or GMO free.37 Part of this trend is toward "local" food, a sector expanding so quickly it is catching up to decades of strong growth in demand for organics.38 We define "local" broadly to mean short supply chains within states or regions where farmers often perform value-added functions, from storing and packaging, to marketing, distribution, and promotion.39 Only partly based on geography, our definition is values-based, emphasizing transparency, ecological farming practices, and connection between growers and eaters. Including direct-to-consumer (DTC) and intermediated sales,5 most local food is produced on small farms near metropolitan areas,40 farms that our analyses show are increasingly threatened. DTC sales more than tripled since 2002,41 indicating that consumer appetite for local food keeps growing. Two thirds of DTC sales come from farms in metro counties, and more than 80 percent of these farms sell all their DTC products within a 100-mile radius of the farm.42 But intermediated markets are driving the sector's rapid growth, reporting more than three times the sales of DTC markets in 201742 as institutional demand increased from schools, hospitals, and restaurants. Meeting demand from these markets will require more land, and more farmers will have to balance the challenges and opportunities of farming in metro and adjacent communities. These areas supply nearly 60 percent of total farm market value for U.S. farm production: 90 percent of fruits, nuts, and berries; 81 percent of vegetables and melons; 66 percent of dairy; and 55 percent of eggs and poultry. As low-density residential development expands across the countryside, this land—and the bounty of fresh food and other products it supports—are especially at risk of conversion. Furthermore, many of these farms are small with low profit margins, thus especially vulnerable to foreign competition as well as competition for land.44 Indeed, since the 1990s, imports have risen 12 to 34 percent for fruits and 10 to 34 percent for vegetables. To sustain domestic food supply and increase our ability to produce food locally, we must address the 21st century threats to our most productive farmland. It is shortsighted to rely on a small handful of states to supply so much of the food we eat—especially our fruits and vegetables. It takes regionally diverse and sometimes redundant systems to support the growing and increasingly complex public demands from agriculture. To ensure resiliency as well as prosperity in our food and farming systems, each state needs to secure a critical mass of high-quality farmland, support agricultural viability and a new generation of farmers and ranchers, and promote regenerative farming practices to build healthy soil and combat climate change.

US ag k2 global food supply

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Risks for Global Food Security Following World War II, **the United States shaped the postwar international food order, becoming a central player in international food aid and trade** (Friedmann, 1982). Over the second half of the twentieth century, through the influence of US policies regarding grain exports, the direction of trade, particularly of grains, shifted to flow toward developing countries. Export subsidies created new markets for US agricultural goods and substantially increased the amount of food imports globally, most dramatically global imports of wheat from the United States and other developed nations (Winders, 2009). While the policies governing agricultural trade have changed over time, **the United States remains central to international food trade, especially for staple commodities. Because of the interconnected nature of the global food system and the role of the United States as a major exporter of agricultural products, disruptions to US production can have far-reaching impacts. The United States is a major exporter of staple foods, accounting for around 37, 17, and 16% of internationally traded soy, maize, and wheat, respectively,** in 2013 (FAOSTAT, 2019c). From 2012 to 2016, the United States exported wheat and wheat products to 174 different countries (Figure 1) and maize and maize products to 162 countries over the same period (FAOSTAT, 2019b). Using the 2009 cereal trade network, Marchand et al. (2016) simulate the effects of production shocks in different origin countries. They found that the **most substantial supply declines in trade partners are caused by shocks that induce a production drop in the United States.** US production of crops—particularly staple crops of wheat, maize, and soy—remains heavily centered in the Great Plains region (USDA, 2016). This region has experienced periodic drought throughout the twentieth century to present, including severe droughts in the 1950s, 1988, and 2012 (Rosenzweig et al., 2001; Schubert et al., 2004a; Hoerling et al., 2012). Agricultural production in the Great Plains shifted over the twentieth century to rely heavily on irrigation from the Ogallala aquifer, buffering the impacts of droughts on agricultural production since the Dust Bowl (Hornbeck and Keskin, 2014). However, variability in temperature and rainfall, both droughts and floods, as well as the related spread of agricultural pests and diseases, continues to affect agricultural production (Rosenzweig et al., 2001). Additionally, aquifer overexploitation occurring in the Great Plains, particularly during times of drought, threatens the ability of groundwater to continue buffering the effects of drought on American agricultural production (Scanlon et al., 2012). Given the central role of the United States in the international agricultural trade, the consequences of a large-scale production shock would extend far beyond US consumption and food security. Quantitative studies that assess the implications of specific natural disasters on food security via food production and trade are particularly useful, yet scarce (exceptions include Puma et al., 2015; Gephart et al., 2016, and Suweis et al., 2015). Assessing the potential impact of extreme weather events not only on food production, but also on the global trade system, is critical for understanding the far-reaching effects of production shocks in a globalized economy. This article aims to contribute to the nascent literature connecting climate shocks to food supply and trade through modeling the changes in international trade and reserves in response to a Dust Bowl–sized shock on contemporary US production.

Causes instability and nuke war

Porteous 20 (Huon Porteous, Honors Student in Philosophy at the Australian National University, President of the Local Effective Altruism Society, "Food Insecurity", Commission for the Human Future, Human Future, DOP: 2020 https://www.humanfuture.net/food-insecurity/ // DOA: 12/2/24)ops

Widespread and **consistent access to food makes it possible to live in a stable society**. **Without this** guarantee, the incidence of **political instability and war tends to increase**. There is an **emerging body of evidence that food crises can initiate political instability**5,6,7, **increasing the risk of conflict through various means**, such as a decay in the ability of a state to govern its people.8 In one recent example, **the severe drought that struck Syria between 2007 and 2010 contributed to massive crop failures that undermined livelihoods and forced 1.5 million people from rural areas into cities, exacerbating existing social stresses.**9 Though the drought was clearly not the primary cause of the Syrian Civil War, it contributed to a regional refugee crisis that spilt over into Europe, and had profound effects on the politics of countries across the region, which are still playing out today. **Even minor shocks to the food supply** can **have severe consequences**. **From 2006 to 2008, large maize-exporting countries like Brazil, Argentina and Ukraine imposed export bans, which together with droughts and rising oil prices precipitated a price spike of 83%, causing economic instability and social unrest across much of the developing world.**10 Such price volatility in food disproportionately affects the approximately 800 million people living in extreme poverty.11 Political instability is most dangerous when it occurs in countries with access to weapons of mass destruction. **Should a food crisis arise in one of these countries occur that results in civil war and governmental collapse, these weapons could end up in the hands of a group that intends to use them maliciously as an act of terror.** The fact that Pakistan (which has access to nuclear bombs) and Iran (considered capable of producing bioweapons) are ranked the 25th and 44th most fragile states in the world is cause for concern that food insecurity in those regions could have severe consequences.12 Risks of total food production loss When Indonesia's Mount Tambora erupted in 1815, dark volcanic dust and reflective sulphate aerosols thrust into the skies are thought to have lowered global temperatures by 1°C. The United States experienced snowfall in summertime and China, North America and Europe suffered crop failures and ensuing famines.13 We could easily see such effects again in future after a sufficiently large volcanic eruption or even a small-scale nuclear exchange. There is some evidence from climate science that indicates it would take the detonation of only 50-100 nuclear weapons in populated cities to lift millions of tonnes of combustible material into the atmosphere and trigger what is known as nuclear winter, sharply lowering global temperatures over a decade.14,15 Summer temperatures would drop by more than 20°C over much of North America and Asia, and would stay continually below freezing for several years in the mid-latitudes, where most of our food is produced. Such drastic changes to the climate have the potential to bring food production to a near-complete halt, leaving billions at risk of starvation. While we'd lose almost all of our regular food production, it's likely there would be some food production via cold-tolerant crops and alternative foods such as seaweed and algae. Some human populations would likely survive, though in a vastly different world. The ability of surviving populations to recover an equivalent level of civilization is unclear.16,17 (See also our page on risks from nuclear war.) Catastrophes such as this that result in (near or) total food production loss pose the most severe risks to global food production. The likelihood of such a total food production loss scenario is dominated by the anthropogenic risk of nuclear winter, with the natural risks like supervolcanoes or asteroid impacts having similar effects but being far less likely. Estimates of a total food production loss scenario vary between 1-10% this century, with a risk of human extinction of approximately 0.1%. Risks of significant food production loss Risks of significant food production loss are those that could result in a 3-30% reduction in our food production capacity. While this might sound much less extreme by comparison, keep in mind that all disasters in living memory have been less than a 3% loss. Based on current research18, there is an approximately 80% chance of significant food production loss this century. Sources of such risks include: Global warming resulting in multiple bread-basket failure19; Catastrophic crop disease to staple crops – the grass family poaceae (which includes wheat, rye, and barley) alone contributes 50% of the world's calories20,21; A severe pandemic – pandemics can impact global trade systems, limit movement of agricultural workers, and decrease affordability of food. The ebola virus resulted in a significant reduction in regional food security22, while COVID 19 had impacts on global trade and buying power of global poor.23 Loss of pollinators – in Europe, pollination services represents some 12% of food production, mainly by increasing the yield of fruits, vegetables and nuts.24 Global agricultural losses are estimated at between 3-8% in the event insect pollination were to fail.25 There are also risks of significant food production loss that would occur via failures of the physical infrastructure needed to produce food. We rely on a complex network of interlinked infrastructure – e.g. electricity, fossil fuels, water, telecommunication, etc – to run the industrial systems which provide the goods and services we consume daily. Food production, which has become increasingly industrialized since the 20th century, is highly dependent on the proper functioning of these systems. This is exemplified by modern agriculture's reliance on synthetic fertilizers. An estimated 40-50% of the world's population survives on food produced from fertilizers made through the Haber-Bosch process26, which requires gas (fossil fuel) and electrical infrastructure as well as transportation networks to distribute. Infrastructure is vulnerable to various low probability high impact events such as High Altitude Magnetic Pulse (HEMP)27, space weather (solar storms or coronal mass ejections)28,29,30, pandemics31, and coordinated cyber-attacks.32 Such events could result in major impacts on food systems.33 Conclusion **Food insecurity is a global catastrophic risk factor increasing the likelihood of** other catastrophes occurring (e.g., **nuclear war) or decreasing our resilience to catastrophes. Even if no catastrophe results from prolonged food insecurity, such significant food system failures would be robustly bad, potentially causing hundreds of millions to die.** The complex nature of food security and the highly interdisciplinary nature of the problem, makes it a difficult problem to address.

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

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

Causes extinction per Starr.

Thus, we affirm.

REBUTTAL:

On oil

On econ

1. NU: Economy is structurally stagnating

Dai et al 25 (Sheng Dai et al: Associate professor at Zhongnan University et al. 19 March 2025, "Can Omitted Carbon Abatement Explain Productivity Stagnation?", The review of income and wealth, https://onlinelibrary.wiley.com/doi/10.1111/roiw.70012?af=R .//. DOA: 3/31/25) TZL

The **secular stagnation** of productivity growth **has** occurred in virtually all Western countries since the financial crisis that started in the US in 2008 and subsequently **led to the European debt crises and the period known as the Great Recession** (see, e.g., Syverson 2017; Crafts 2018). Several possible explanations for productivity stagnation have been suggested in economics. Firstly, since technological progress is traditionally seen as the main driver of productivity growth, it seems natural that **the recent stagnation may be due to the slowdown of innovations.** Most notably, Gordon (2012) and Bloom et al. (2020) have suggested that new ideas get harder to find over time. As previous innovations have already been utilized, it **is increasingly more difficult to generate genuine innovations that would further boost productivity growth.** Bloom et al. (2020) provide evidence that links declining innovation to productivity stagnation. Secondly, since most **countries have unemployment and underutilized productive capacity, aggregate productivity slowdown could also relate to inefficient allocation of resources** in the economy. **Empirical work in the US** and Europe **suggests that business dynamism** (e.g., **firm entry, job creation, or job turnover) has been declining (**see, e.g., Decker et al. 2016; Grossman et al. 2017), which can slow down productivity growth. Further, De Loecker et al. (2020) suggest that there have been rising markups, which further suggests that the **market power of firms has been increasing**. Such increasing market power is connected to productivity slowdown. Both declining business dynamism and rising markups can contribute to the misallocation of resources. **Previous misallocation studies** (e.g., Hsieh and Klenow 2009; Restuccia and Rogerson 2017**) focused on comparing developing countries with the US, but during the current productivity stagnation it has been suggested that misallocation of resources might have something to do with the declining productivity** and it might be related to the previous two explanations. For example, increasing market power and markups can lead to inefficient allocation of resources. The third type of explanation refers to measurement challenges in total factor productivity (TFP). For example, the digital economy provides new goods such as information and entertainment services free of charge (e.g., Brynjolfsson et al. 2021). Since free digital services and improved quality of services are not included in the conventional national accounts, measured productivity growth can be downward biased due to mismeasurement. One potentially important explanation for productivity stagnation, which relates to the broader theme of mismeasurement but has thus far attracted little attention, hinges on the ongoing transition to mitigate climate change. Specifically, reducing greenhouse gas (GHG) emissions requires massive capital investments and innovation efforts, which are included in the measured capital stock (or capital services) and labor inputs. However, such inputs do not contribute to the measured GDP. Since the conventional TFP measures ignore the social benefits of GHG abatement, the measured TFP can slow down when the inputs of the GHG abatement are included, but the outputs are excluded. The purpose of this paper is to explore whether considering GHG emissions can explain productivity stagnation in OECD countries. Our first contribution is to empirically investigate the impacts of GHG emissions, fixed capital, and human capital on productivity growth. We measure productivity growth with and without GHG emissions, compare green TFP growth based on either capital stocks or capital services and calculate green TFP growth with and without human capital. The results confirm that the measured productivity growth is considerably higher when the GHG emissions are accounted for. For countries that have reduced GHG emissions most actively, the average green TFP growth rate could double the conventional TFP growth. Further, the choice of fixed capital and human capital would also have non-negligible impacts on green TFP growth. To achieve our main purpose, the second contribution of this paper is to construct a novel quantile shadow-price Fisher index to gauge green TFP growth. The proposed quantile shadow-price Fisher index does not require the real price data for input-output variables and can avoid an ad hoc choice of quantiles which may lead to different productivity estimates and allow quantiles to move in the inter-period sample.1 To operationalize the proposed index, the third contribution of this paper is to develop a penalized convex quantile regression (CQR) approach to estimate shadow prices. In doing so, **we regularize the CQR approach by adding an extra regularization term on subgradients to increase the convexity of the objective function. Compared to the conventional full frontier approach, penalized CQR can guarantee the uniqueness of estimated shadow prices and take inefficiency into account explicitl**y. Furthermore, **theproposed approach is more robust to outliers and heterogeneity by inheriting the appealing features from quantile regression.**

Pref: more holistic than fox and our ev doesnt talk abt ptx

2. T: Nuclear industry increases economic growth

Nessen and Brun 24 (Joseph C. Von Nessen is a research economist in the Division of Research at the Darla Moore School of Business where he specializes in regional economics, regional economic forecasting and housing economics. He regularly conducts a wide variety of economic impact analyses, feasibility studies and independent market research projects for clients in both the private and public sector. Lukas Brun is Managing Director of Research and Economic Development for E4 Carolinas, the trade association for energy companies and energy-related organizations in the Carolinas. He manages federal grants investigating the future of alternative fuel vehicles, advanced nuclear technologies, green hydrogen, and clean energy grid hardware in the Southeast. February 2024, "The Economic Impact of the Nuclear Industry in the Southeast United States", E4 Carolina, https://www.commerce.virginia.gov/media/governorvirginiagov/secretary-of-commerce-and-trade/va-n uclear/E4_Carolinas_Economic_Impact_Report_Final.pdf, DOA: 3/7/2025) SMB

The nuclear industry makes sizeable and unique contributions to the region's economy. Nuclear power plants, in particular, currently employ a sizable workforce and support large, extensive supply chain networks throughout the local regions in which they are located. These supply chain networks, in turn, generate significant economic ripple effects across many industries that are far higher than in most other industry sectors. These ripple effects include additional indirect job creation that supports higher incomes for local residents and a substantial increase in overall economic activity. This section

of the report documents the economic impact of the nuclear industry in the Southeastern United States, with a specific focus on the states of Georgia, North Carolina, South Carolina, Tennessee, and Virginia – including all ongoing operations and associated business activities. There have been multiple previous impact studies that have examined the size and scope of the nuclear industry at both the regional and national level in recent years. At the national level, the most frequently published research comes from the United States Department of Energy's (DOE) annual release of its U.S. Energy & Employment Report, which estimates the direct employment base of the nuclear industry alongside a broader assessment of the economic impacts resulting from electric power generation. Additionally, the Nuclear Energy Institute, the World Nuclear Association, as well as many private research groups have all assessed the economic impact of the U.S. nuclear industry using a variety of overlapping methodologies as they seek to quantify and focus on different components of the industry.i The economic impact of the nuclear industry in the Southeastern United States that is most closely associated with the approach taken in this study is the Carolinas' Nuclear Cluster CELDi Project Report 2012-2013 conducted by Clemson University in 2013, which focused exclusively on the states of North and South Carolina. The study was completed during a period in which there was active construction of new nuclear reactors in and around the Carolinas two-state region as well as before the cessation of all activities at the V.C. Summer nuclear station in Jenkinsville, South Carolina. As such, the composition of the nuclear industry has changed substantially in the years since, requiring an updated assessment of the economic impact of the region. Finally, there have been various economic assessments that have examined the specific impacts of individual national lab sites along with related professional service, supplier, and research & development firms around the country that support the nuclear industry. The studies include the ongoing nuclear-related activities at the facility being examined, but are generally focused on examining the total impact of the facility, including non-nuclear activities. As a result, these studies tend to overestimate the contribution of these facilities to the nuclear industry alone. All organizations encompassing the nuclear industry as defined above collectively employ a large workforce and support an extensive supply chain network throughout the five-state region in order to facilitate their ongoing operations. **The expenditures made by these organizations with local businesses and suppliers as well as through wages and salaries paid to employees introduce new spending activity at a statewide and regional level that would not exist otherwise. As a result, the presence of the nuclear industry in each state provides a stable base of activity that also helps contribute to long-run economic growth. Economic impacts can be divided into direct, indirect, and induced impacts. Direct effects are based on the activity of the nuclear power plant itself, typically described in terms of employment at, or sales generated by, a facility. Indirect effects are based on the supply chain effects of a facility, in our example, a nuclear power plant. For example, when a nuclear power plant purchases goods and services from one of its vendors, this vendor experiences an increase in demand. To satisfy this demand, it must then hire more workers and increase purchases from its own suppliers. These suppliers then experience an increase in demand, and so on. Thus, the initial dollars that are spent by the nuclear power plant are re-spent over and over again through a supplier network, which is known as the indirect effect. A similar effect – known as the induced effect – occurs with the employees of the nuclear power plant and its suppliers. These workers spend part of their incomes in the local economy, thereby increasing the demand for a variety of goods and services (such as dining, transportation, or recreation).**

3. T: Nuclear energy reduces energy poverty

Follett 16 (Andrew Follett, energy and science reporter, 16 January 2016, "7 Ways The Grand Solution We're All Looking For Could Actually Be In Nuclear Power", Daily Caller, https://dailycaller.com/2016/01/16/7-ways-the-grand-solution-were-all-looking-for-could-actually-be-in nuclear-power/#ixzz4HR1Vfeka, DOA 3/27/2025) ESR

5: **High Energy Costs Disproportionately Hurt The Poor And Ethnic Minorities Electricity from new "green" energy is nearly four times as expensive as electricity from existing nuclear power plants**, according to analysis from the Institute for Energy Research. The **high costs** of "green" energy **are passed onto ordinary rate-payers, which has triggered complaints that poor households are subsidizing the affluent.** The

poor and ethnic minorities tend to spend a higher proportion of their incomes on "basic needs" like groceries, power bills, clothing, housing and gasoline. As essential goods like electricity become more expensive, the cost of producing goods and services that use electricity increases, effectively raising the price of almost everything. Consumers, not industries, ultimately pay for the increase in costs. Increases in the price of electricity harm ethnic minorities far more than they harm the average household, according to a study by the Pacific Research Institute. Further **EPA regulation is expected to cause the average annual electricity bill to rise from 2.9 percent to 3.8 percent of annual income for the average household**. For the average African-American household, annual spending on electricity will rise from 4.5 percent to 5.8 percent of household income. **Lower-income black communities will bear an even larger burden and could spend up to 26 percent of their household income on electricity.**

o/w sev - harms minorities the worse under green energy; pov kills them first

4. T: Fossil fuel reliance decks the econ

Halverson 22 (Cadet Halverson is a sophomore at the Air Force Academy. He was previously enlisted as a Cyberspace Operations Airman. He is studying Behavioral Science. He is interested in serving as an Information Operator or Pilot. Aug 25 2022, "The United States Must Pursue Greater Nuclear Energy Power Generation", Air University, https://www.airuniversity.af.edu/Wild-Blue-Yonder/Articles/Article-Display/Article/3126436/the-united-states-must-pursue-greater-nuclear-energy-power-generation/, DOA 3/1/25) RK

Our reliance on fossil fuels also challenges our economic security. Rising hospitalizations due to our dirtier air will lead to higher healthcare costs, placing a strain on Americans' wallets. Crop failures, coastal cities dealing with rising sea levels, and an increased level of natural disasters are just some of the factors that will damage our economic output, costing the United States up to 10.5 percent of its GDP by 2100.[3] Dependency on fossil fuels is a threat to our national and economic security and warrants a response.**Nuclear power is one alternative to fossil fuels that will provide the United States with more security. Nuclear power currently provides 20 percent of the United States' power output, and it produces little to no greenhouse gas emissions**.[4] **With advancements in nuclear reactor technology, it has the potential to produce much more energy in a more efficient manner.One of the greatest potentials for nuclear energy is the advancement of small transportable reactors**.[5] **These small, portable reactors give nuclear energy the potential to provide energy for remote rural communities.**

Decreasing oil dependence per their own link solves

5. T: Nuclear energy mitigates green transition risks and reinvigorates growth

Bennett and Gilbert 22 (River Bennett and Alex Gilbert: Fellow at Nuclear Innovation Alliance and fellow with the Payne Institute at the Colorado School of Mines. 19 January 2022, "Can Nuclear Energy Jobs Power a Just Transition?", good energy collective, https://cdn.prod.website-files.com/5f05cd440196dc2be1636955/61e864060e5d8dc834dbaaa4_Can%20Nuclear%20Energy%20Jobs%20Power%20a%20Just%20Transition.pdf .//. DOA: 3/4/25) TZL

H.Res.332 seeks to codify a U.S. clean energy mobilization that "creates high-quality union jobs that pay prevailing wages, hires local workers, offers training and advancement opportunities, and guarantees direct replacement of lost wages, health care, retirement, and other benefits for workers

affected by the transition." Environmental advocates increasingly employ or invoke this Just Transition framework when developing industrial-focused climate policies, and the concept has attained a global currency: More than 50 heads of state signed onto a Solidarity and Just Transition Silesia Declaration at the 24th annual Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change, held in coal-powered Poland in 2018, and the European Commission has developed the "Just Transition Mechanism" as part of its European Green Deal. But nearly three years later, **no U.S.-based national energy sector union has explicitly supported the GND**. For them, **Just Transition** language raises the specter of lost jobs, falling wages, and abandonment. The friction between GND ambitions and those it is designed to mobilize suggests that advocates' current conceptualization and communication of a Just Transition is too narrow to broaden its support. For instance, in their letter to Sen. Markey and Rep. Ocasio-Cortez, the unions on the AFL-CIO Energy Committee acknowledged the need to invest in all kinds of energy technologies, from solar and wind to nuclear energy. This raises the question: **could a more technology-inclusive clean energy job framework broaden support?** For example, **nuclear energy has long held the support of labor unions and heavy industry. With the United States home to dozens of advanced nuclear companies working to commercialize new designs, this technology may help bridge the gap between GND advocates and labor unions** on how to achieve a Just Transition. However, to earn the support of GND supporters and environmental justice communities, nuclear developers and operators will have to reckon with their past, take the needs of struggling communities into account, and commit to more equitable models of deployment and engagement. Doing so will mean coming to terms with legacy weapons waste issues, mitigating ongoing conflicts with local communities over uranium mining, and embracing modern siting practices for reactors and waste. If the nuclear industry can do this and help to reconcile a Just Transition with environmental justice concerns on the ground, **advanced nuclear can support domestic decarbonization, help increase political support for climate action, and alleviate the negative economic impacts of the United States' energy transition on fossil fuel-producing communities.** The Story of Just Transition "Just Transition" has roots in the U.S. labor movement itself. Anthony Mazzocchi, the president of the Oil, Chemical and Atomic Workers Union, coined the term in response to the closure of the Ciba-Geigy chemical facility in Toms River, New Jersey in the mid-1980s. Under the prevailing Just Transition narrative, today's fossil fuel workers become the bricklayers of a clean energy economy**. Renewable energy technologies replace pipelines and refineries, shuttered coal plants and other fossil fuel infrastructure provide** the **sites** and grid connections **for** wind, solar, and battery **installations**, and **fossil fuel workers enroll in retraining programs** and graduate as clean energy technicians. This vision has yet to manifest fully. Researchers still debate the feasibility of a grid powered exclusively by wind, water, and sun, and building trade unions that work in and around the fossil fuel sector do not yet see a path forward by which a clean energy transition does not reduce their membership or political power. By many metrics, **the fossil fuel industry is the largest and most economically enmeshed on the planet**. Oil, gas, and coal development depends on specific worker skillsets and geographies that make it difficult to develop one-to-one comparisons between jobs in fossil fuels and clean energy. However, primary and secondary employment associated with power plants offers an apples-to-apples comparison in terms of jobs produced per gigawatt-hour (GWh) using fossil energies or clean energies for electric power generation. **Power plants provide the type of high-quality, well-paid employment that unions seek:** Researchers from UC Berkeley have found that on a per GWh basis, conventional nuclear power supports 0.14 full-time equivalent annual jobs per GWh, compared to 0.11 for coal and natural gas. Renewable fields vary greatly on this metric, from 0.17 jobs per GWh for wind to 0.87 for solar. However, much of the renewables job data is based on early- and mid-2000s data that predates the modern wind and solar industry. A more recent review confirmed a wide range exists in renewables job generation, including within technology classes. That review also found that nuclear power plant jobs slightly exceed those for coal and natural gas plants, and that renewable jobs exceed all three. By one estimate, **the build-out of nuclear reactors to replace fossil fuels could boost overall sector employment by tens of thousands** of jobs. **Communities with a heavy reliance on fossil employment value fossil-related jobs for their high prevailing wages, which can dwarf the wages of renewable workers**. According to the U.S. Bureau of Labor Statistics, the 2020 median annual pay for power plant operators, distributors, and dispatchers was $85,950, while the average annual pay for wind turbine technicians and solar photovoltaic installers stood at $52,910 and $44,890. **This pay gap is in part a consequence of renewable industry employers' reticence to support** the **unionization** of their workers. For instance, in September 2019, a California judge found that clean energy icon Elon Musk and other executives at the automaker Tesla Inc. violated labor laws by attempting to bust employees' unionization efforts. Two months later, the New York solar power company Bright Power fired construction workers for trying to join IBEW and form one of the first unions in the solar industry. In both cases, workers tried to unionize to improve safety and wage rates. For Just Transition advocates looking for a bigger clean energy carrot to entice fossil workers, **high-paying nuclear power jobs could prove a useful alignment of interests**. While nuclear energy produces fewer jobs than renewable energy overall, today's **wages at nuclear power plants** usually **exceed wages at renewable and fossil energy positions, in part due to the high rate of unionization of nuclear plant workers** compared to other energy industries. **Unionization is particularly high among workforces that build new nuclear plants**. On average, nuclear power plant employees are compensated for the longer training periods they undergo than do other plant operators. In 2020, U.S. nuclear reactor operators received a median annual pay of $100,530. Although U.S. Nuclear Regulatory Commission regulations do not require nuclear operators to have a college degree, the average nuclear engineer with a bachelor's degree earns around $113,460. As with renewables, **nuclear plants** also **support large numbers of local jobs during construction**. **Unlike** smaller, distributed **renewable projects**, both fossil and **nuclear power plants form the economic bedrock of** the

communities that host them. Coal plant closures illustrate the scale: In Canon, Illinois, the 425-megawatt (MW) coal-fired Duck Creek Power Plant previously paid nearly $2 million in property taxes annually, contributing roughly $950,000 to the school budget. The Manchester Local School District near Aberdeen, Ohio, saw a 30% budget reduction after two coal plants both closed on the same day. Similarly, when the Oyster Creek Generating Station in Lacey Township, New Jersey—a community so connected to the nuclear plant that its municipal seal bears an atom—closed in 2018, the township lost $11 million in annual tax revenue. The Town of Vernon, Vermont saw its tax base cut in half after the Vermont Yankee nuclear power plant closed in 2014. According to the Brattle Group, the three nuclear power plants still operating in upstate New York "are responsible for $144 million in net state tax revenues annually, including more than $60 million in annual state and local property taxes." The closure of the Indian Point Nuclear Power Plant in Buchanan, New York, is expected to extinguish over $30 million in annual tax revenue.

On climate

1. NU: Emissions are increasing

Keppler 24 (Jan Horst Keppler, Senior Economic Advisor in the Division of Nuclear Technology Development and Economics (NTE) at the OECD Nuclear Energy Agency (NEA), "NUCLEAR ENERGY IN THE GLOBAL ENERGY LANDSCAPE: ADVANCING SUSTAINABILITY AND ENSURING ENERGY SECURITY" in NUCLEAR ENERGY IN THE GLOBAL ENERGY LANDSCAPE: ADVANCING SUSTAINABILITY AND ENSURING ENERGY SECURITY?, Feb 2024, DOA 3/13/25 https://www.oxfordenergy.org/wpcms/wp-content/uploads/2024/02/OEF-139-.pdf)

The climate crisis is one of the defining challenges of this generation. Yet **countries are not on track in their efforts to limit global warming**. In order to reduce greenhouse gas emissions in line with the pathways outlined by the Intergovernmental Panel on Climate Change (IPCC), all available options must be pursued. Analysis by the Organisation for Economic Co-operation and Development's (OECD's)**Nuclear Energy Agency (NEA) demonstrates that tripling global installed nuclear capacity is part of a realistic path to meet net-zero goals by 2050** and to keep the rise in global mean temperatures below 1.5°C. **Such an increase in nuclear capacity could avoid more than 80 gigatonnes of cumulative emissions between 2024 and 2050 through a combination of the long-term operation (LTO) of existing reactors**, new large-scale reactor builds, and the deployment of small modular reactors (SMRs). **By 2050, nuclear energy could thus displace 5 gigatonnes of emissions each year, which is more than the annual emissions of the economy of the United States today.** The deployment of new nuclear capacity will take place at the national level in the frameworks of country-specific commitments to attain net-zero targets. A large set of country-level studies indeed show that including significant shares of **nuclear energy is**, in the vast majority of cases,**the most cost-effective way to realize these targets**. The precise level of the cost-minimizing share of nuclear energy in the generation mix depends on the following three country-specific parameters that affect the overall functioning of the electricity and energy systems: 1. the relative costs of nuclear energy compared to other low-carbon technologies such as hydro, wind, and solar PV; 2. the availability of flexibility resources to balance the intermittency of wind and solar PV generation; 3. the correlation of wind and solar PV generation with electricity demand. System-level analysis is indispensable for understanding the relative contribution of different technologies in low-carbon electricity systems. As a baseload technology that reliably generates large amounts of low-carbon electricity, nuclear energy possesses very favourable system characteristics. **However, relative plant-level costs do remain an important determinant of system performance, and the nuclear industry will have to rise to the challenge, at both the national and global levels,** to deliver sizeable amounts of new nuclear capacity on budget and on time. This report sets out the potential for nuclear energy to advance sustainability and ensure energy security first at the global and then at the national level, before presenting a number of policy conclusions. The contribution to carbon emission reductions of a tripling of global nuclear capacity Worldwide, 444 nuclear power reactors with 394 gigawatts provide around 2,500 terawatt-hours of electricity per year, roughly 10 per cent of the total global supply. In addition, 50 more reactors are under construction to provide an additional 55 gigawatts of capacity, and more than 100 additional reactors are planned. **Widely accepted models show that nuclear energy has a decisive role to play in global climate change mitigation**.1 As already highlighted by the 2018 IPCC synthesis report,2 **the world is not on track to meet the decarbonization**

objectives of the Paris Agreement, as **the sustained reductions in greenhouse gas emissions are not occurring at the required speed. Things have worsened** since. **Global emissions are expected to increase by 2030**, rather than undergoing the steep reductions called for by leading climate scientists. The window for action is rapidly narrowing. Carbon emissions must peak within the next decade and reach net zero by 2050. **This will require comprehensive policy changes globally, substantial investments in innovation and infrastructure, and the largescale deployment of non-emitting energy resources**. Electricity grids must be decarbonized; vehicle fleets must be electrified or transitioned to non-emitting fuels; and industries must be transformed across sectors, including off-grid mining, buildings, and the production of chemicals, iron, steel, and cement The nuclear sector supports climate change mitigation in many different ways. Existing large-scale installed nuclear capacity already plays an important role, and the LTO of existing reactors will continue to contribute for decades, displacing 1.6 gigatonnes of carbon dioxide emissions every year—a cumulative 66 gigatonnes of carbon dioxide so far since 1971.3 Additional measures will be required to meet climate action imperatives. In its 2018 special report, the IPCC considered 90 pathways with emissions reductions sufficient to limit average global warming to less than 1.5°C. The IPCC found that, on average, the pathways to this 1.5°C scenario require nuclear energy to reach 1,160 gigawatts of electricity by 2050, up from 394 gigawatts in 2020.4 This is an ambitious target for nuclear energy, but not beyond reach. It can be achieved through a combination of LTO, largescale new builds, and the deployment of SMRs, as shown in Figure 1. Figure 1: Nuclear contributions to net zero under different scenarios Source: Nuclear Energy Agency (2022), Meeting Climate Change Targets: The Role of Nuclear Energy, Paris: OECD Publishing, www.oecdnea.org/jcms/pl_69396. In 2022 nuclear energy was the largest source of non-emitting electricity generation in the countries of the OECD and the second largest source worldwide after hydropower. Reaching the IPCC target of 1,160 gigawatts of electrical capacity from nuclear energy would, in this scenario, avoid 87 gigatonnes of cumulative emissions between 2020 and 2050, preserving 20 per cent of the world's carbon budget consistent with a 1.5°C scenario. **With the development of Generation IV reactors and SMRs, a new wave of innovative nuclear technologies promises to help provide clean energy baseload power and decarbonize hard-to-abate industrial sectors.** These innovations include sector coupling, combined heat and power (co-generation) for heavy industry and resource extraction, hydrogen and synthetic fuel production, desalination, and off-grid applications. **The main contribution of nuclear energy in pathways to net zero by 2050 can be seen by estimating its potential contribution for emissions reductions through clean power generation,** the supply of industrial heat, and the production of clean hydrogen (Table 1). 3 Nuclear Energy Agency (2020), Unlocking Reductions in the Construction Costs of Nuclear: A Practical Guide for Stakeholders, Paris: OECD Publishing, www.oecd-nea.org/jcms/pl_30653. 4 Intergovernmental Panel on Climate Change (2018), Global Warming of 1.5°C, www.ipcc.ch/sr15. 10 February 2024: ISSUE 139 OXFORD ENERGY FORUM Table 1: Projected contributions of nuclear energy to global emissions reductions, 2020–2050 (Gt CO2) Cumulative emissions avoided from … Electricity Heat Hydrogen Total Long-term operation 38.3 6.7 4.3 49.2 New builds of large Generation III reactors 16.2 4.2 2.4 22.8 Small modular reactors 9.7 3.6 1.8 15.1 Total 64.1 14.5 8.5 87.1 **Clearly, such a dramatic increase in nuclear capacity would pose a significant industrial challenge. However, both recent and historical experiences show that, under the right policy frameworks and with a robust industrial approach, nuclear capacity can have rapid delivery times.** This was the **case historically for countries such as France and jurisdictions such as Ontario in Canada, which decarbonized their electricity mix in less than two decades** with nuclear energy and hydropower. Today**, countries with established nuclear programmes**such as China and South Korea have **demonstrated construction lead times of five to six years or less for large-scale reactors with increased safety**. Newcomer countries, such as the United Arab Emirates

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2. T: Nuclear energy solves rising emissions

Matthew 21 (M.D. Matthew works as part of Saintgits College of Engineering, Kerala, India. 12/11/2021, "Nuclear energy: A pathway towards mitigation of global warming", Progress in Nuclear Energy, https://aben.com.br/wp-content/uploads/2022/02/Nuclear-energy-a-pathway-towards-mitigation-of-glo bal-warming.pdf, DOA: 3/4/2025) SMB

The clean energy transition means shifting from fossil energy to energy resources that release little or no greenhouse gases such as nuclear power, hydro, wind and solar. **About a third of the world's carbonfree electricity comes from nuclear energy**.**Nuclear power has a great potential to contribute to the 1.5 ◦C Paris climate change target. Nuclear power plants produce no greenhouse gas emissions during their operation; only very low emissions are produced over their full life cycle. Even after accounting for the entire life cycle from mining of nuclear fuel to spent fuel waste management, nuclear power is proven to be a low carbon electricity source**. During operation and maintenance, nuclear power plants produce different levels of solid and liquid waste and are treated and disposed-off safely. While conventional fossil-fueled power plants cause emissions almost exclusively from the plant site, the majority of greenhouse gas emissions in the nuclear fuel cycle are caused in processing stages upstream (exploration and processing of the uranium ore, fuel fabrication etc.), and downstream from the plant (fuel reprocessing, spent fuel storage etc.).**Over the course of its life-cycle, the amount of CO2-equivalent emissions per unit of electricity produced by nuclear power plants is comparable with that of wind power, and only one-third of the emissions by solar.** The greenhouse gas emissions correspond to 10–15 gm of CO2 per kilowatt hour electricity produced in comparison with the emission from a fossil fueled plant of 600–900 gm, 15–25 gm from wind turbines and hydroelectricity, and around 90 g from solar power plants (Fig. 8) (Carbon Dioxide Emissions, 2021). Nuclear power delivers reliable, affordable and clean energy to support economic growth and social development. **Without a larger role for nuclear energy, it would not be possible to combat climate change. Nuclear power can be deployed on a large scale. So, nuclear power plants can directly replace fossil fueled power plants.** As of end December 2020, global nuclear power capacity was 393 GW(e) and accounted for around 11% of the world's electricity and around 33% of global low carbon electricity. Currently, there are 442 nuclear power reactors in operation in 32 countries. There are 54 reactors under construction in 19 countries, including 4 countries that are building their first nuclear reactors according to the IAEA reports (Nuclear Power Proves its, 2021; Climate Change and Nuclea, 2020a, 2020b).**Nuclear power is reducing CO2 emissions by about two gigatons per year. Therefore, nuclear power will be imperative for achieving the low carbon future.** In France, nuclear power plants accounted for 70.6% of the total electricity generation in 2019, the largest nuclear share for any industrialized country. About 90% of France's electricity comes from low carbon sources (nuclear and renewable combined).**Nuclear power contributes 20% of electricity generation in the United States over the past two decades and it remains the single largest contributor of non-greenhouse-gas-emitting electric power generation out of 1,117,** 475 MWe total electricity generating capacity of which 60% is from fossil fuel. The second-largest source of low carbon energy in use today is nuclear power, after hydropower.**Nuclear power plants provide continuous and stable energy to the grid whereas solar and wind energy require back-up power during their output gaps, such as at night or when the wind stops blowing.** The International Panel on Climate Change (IPCC) has proposed at least doubling of nuclear power generation by 2050 to meet the Paris agreement. Nuclear power has compensated about 60 Gt of CO2 emissions over the past 50 years, nearly equal to 2 years of global energy-related CO2 emissions and can help to conquer the challenges of climate change. **Existing reactors and future advanced nuclear technologies, like Small Modular Reactors (SMRs), can meet base load power needs and also operate flexibly to accommodate renewables and respond to demand.** SMRs are a recent concept to accelerate the construction and commissioning of large nuclear power projects. By adopting the concept of modular manufacture of components, significant reduction in on-site construction time can be achieved. This can also help in reducing the capital costs. **Several types of SMRs are currently under development and these offer improved economics, operational flexibility, enhanced safety, a wider range of plant sizes and the ability to meet the emerging needs of sustainable energy systems.** Some of these reactors are designed to operate up to 700–950 ◦C (for gas cooled reactors) compared to LWRs, which operate at 280–325 ◦C. The electrical efficiency is higher and it can supply high temperature heat to industrial processes. High temperature SMRs can generate hydrogen through more energy efficient processes such as high temperature steam electrolysis or thermochemical cycles. **Their smaller size and easier siting are expected to be a better fit for most non-electric applications**, which require an energy output below 300 MWe.

3. T: Protecting biodiversity

Brook and Bradshaw 14 (Barry W. Brook The Environment Institute and School of Earth and Environmental Sciences, The University of Adelaide, Adelaide, South Australia, 5005 Australia. Corey J. A. Bradshaw The Environment Institute and School of Earth and Environmental Sciences, The University of Adelaide, Adelaide, South Australia, 5005 Australia. Dec 9 2014, "Key role for nuclear energy in global biodiversity conservation", Society for Conservation Biology, https://conbio.onlinelibrary.wiley.com/doi/10.1111/cobi.12433, DOA 3/10/25) RK

Future of Energy Production **Fossil fuels have supplied most of society's energy demand since the Industrial Revolution. Yet with the mounting problems of climate change, pollution, security, and dwindling supplies, we now face the need for a near-total transformation of the world's energy systems**. We have provided a short critical overview of the challenges and trade-offs in—and **potential solutions for**—**completely decarbonizing our energy supplies while meeting the growing need for increased prosperity** in the developing world.**Of the limited options available, next-generation nuclear power and related technologies, based on modular systems with full fuel recycling and inherent safety, hold substantial yet largely unrecognized prospects for being a principal cure for our fossil-fuel addiction, yet nuclear power still has an undeservedly poor reputation in the environmental community. Solving the energy problem** has broader implications: it **will not only help mitigate climate change, it will also avoid destructive use of natural and agricultural landscapes for biofuels and diffuse energy generation and thus allow societies to reduce their environmental footprint by sparing land and resources for biodiversity conservation**. Based on an objective and transparent analysis of our sustainable energy choices, we have come to the evidence-based conclusion that **nuclear energy is a good option for biodiversity conservation (and society in general)** and that other alternatives to fossil fuels should be subjected to the same cost–benefit analyses (in terms of biodiversity and climate outcomes, as well as sociopolitical imperatives) before accepting or dismissing them. We conclude that **large-scale nuclear power—as a route to an electrified, oil-, gas- and coal-free economy—offers a positive way forward because it provides a low-risk pathway to eliminating the fossil-fuel dependencies, global energy poverty, and wealth imbalances that rank among the major forces driving today's biodiversity crisis. At the very least, nuclear power needs to be considered seriously, alongside renewable sources of energy such as wind and solar power, in any robust sustainable energy mix for the future.**

Biodiversity k2 stopping climate change

UN N.D. (United Nations: intergovernmental organization that aims to maintain international peace and security, develop friendly relations among nations and countries, achieve international cooperation, and coordinate the actions of member states. N.D., "Biodiversity- our strongest natural defense against climate change", United Nations Climate Action, https://www.un.org/en/climatechange/science/climate-issues/biodiversity . DOA March 30, 2025) CLS

Biological diversity — or biodiversity — is the variety of life on Earth, in all its forms, from genes and bacteria to entire ecosystems such as forests or coral reefs. The biodiversity we see today is the result of 4.5 billion years of evolution, increasingly influenced by humans. **Biodiversity forms the web of life that we depend on for so many things – food, water, medicine, a stable climate, economic growth, among others. Over half of global GDP is dependent on nature. More than 1 billion people rely on forests for their livelihoods. And land and the ocean absorb more than**

half of all carbon emissions. But nature is in crisis. Up to one million species are threatened with extinction, many within decades. Irreplaceable ecosystems like parts of the Amazon rainforest are turning from carbon sinks into carbon sources due to deforestation. And 85 per cent of wetlands, such as salt marshes and mangrove swamps which absorb large amounts of carbon, have disappeared. How is climate change affecting biodiversity? The main driver of biodiversity loss remains humans' use of land – primarily for food production. Human activity has already altered over 70 per cent of all ice-free land. When land is converted for agriculture, some animal and plant species may lose their habitat and face extinction. But climate change is playing an increasingly important role in the decline of biodiversity. Climate change has altered marine, terrestrial, and freshwater ecosystems around the world. It has caused the loss of local species, increased diseases, and driven mass mortality of plants and animals, resulting in the first climate-driven extinctions. On land, higher temperatures have forced animals and plants to move to higher elevations or higher latitudes, many moving towards the Earth's poles, with far-reaching consequences for ecosystems. The risk of species extinction increases with every degree of warming. In the ocean, rising temperatures increase the risk of irreversible loss of marine and coastal ecosystems. For instance, 14 per cent of the coral from the world's coral reefs was lost between 2009 and 2018, mostly due to climate change, and further warming threatens to destroy almost all remaining reefs. Overall, climate change affects the health of ecosystems, influencing shifts in the distribution of plants, viruses, animals, and even human settlements. This can create increased opportunities for animals to spread diseases and for viruses to spill over to humans. Human health can also be affected by reduced ecosystem services, such as the loss of food, medicine and livelihoods provided by nature. **Why is biodiversity essential for limiting climate change? When human activities produce greenhouse gases, around half of the emissions remain in the atmosphere, while the other half is absorbed by the land and ocean. These ecosystems – and the biodiversity they contain – are natural carbon sinks, providing so-called nature-based solutions to climate change. Protecting, managing, and restoring forests, for example, offers roughly two-thirds of the total mitigation potential of all nature-based solutions. Despite massive and ongoing losses, forests still cover more than 30 per cent of the planet's land. Peatlands – wetlands such as marshes and swamps – cover only 3 per cent of the world's land, but they store twice as much carbon as all the forests. Preserving and restoring peatlands means keeping them wet so the carbon doesn't oxidize and float off into the atmosphere. Ocean habitats such as seagrasses and mangroves can also sequester carbon dioxide from the atmosphere at rates up to four times higher than terrestrial forests can. Their ability to capture and store carbon make mangroves highly valuable in the fight against climate change. Conserving and restoring natural spaces, both on land and in the water, is essential for limiting carbon emissions and adapting to an already changing climate. About one-third of the greenhouse gas emissions reductions needed in the next decade could be achieved by improving nature's ability to absorb emissions.**

4. T: Mining and land use drive decarbonization

Hassan et al 23 (Syed Hassan et al: Researcher at Nanjing University et al. January 2023, "The impact of economic complexity, technology advancements, and nuclear energy consumption on the ecological footprint of the USA: Towards circular economy initiatives", Gondwana Research, https://www.sciencedirect.com/science/article/abs/pii/S1342937X22003148 .//. DOA: 3/10/25) TZL

The circular economy decouples economic activity from finite resource consumption, creating a resilient system that can tackle global challenges such as climate change, biodiversity loss, waste, and pollution. Nuclear energy has been designated as one of the primary concerns of energy sector modernization because it allows for significant reductions in dangerous material emissions into the environment. Therefore, **nuclear energy** and improved **technologies may become critical growth areas aligned with circular economy principles**. We use Dynamic Autoregressive Distributive Lag (DARDL) and Kernel-based Regularized Least Squares (KRLS) to analyze United States data from 1985 to 2016 empirically. The DARDL result shows a positive relationship between ecological footprint and economic complexity, increasing short-term environmental costs. However, **nuclear power generation** and improved **technology significantly reduce ecological concerns**. Economic complexity is explored in this work in more nuanced terms, emphasizing the importance of considering the external environment when implementing different economic activities. Policy implications, study limitations, and future research directions are discussed. <<graph omitted>> Introduction Climate change severely threatens humanity's progress and existence, including food shortages, wildlife extinction, and harsh weather. Environmental and economic goals must be balanced in both developed and developing countries. On the one hand, the recent fast rise of global economies has allowed them to build essential infrastructure, relieve poverty, and enhance residents' living standards. On the other side, in the quest for fast economic growth, global economies have compromised natural capital, resulting in major environmental challenges such as energy resource exploitation, biodiversity loss, land degradation, and water and air pollution. To achieve low-emission economies, we need global collaboration and coordinated actions. Climate change has a detrimental influence on society, the economy, the ecology, and the environment. The fundamental causes of environmental deterioration are ecological footprints (EFP) and an increase in resource utilization (United Nations, 2018). The EFP monitors and defines anthropogenic stress on the environment caused by the human population and the biosphere's ability to regenerate. Because EFP is an aggregate measure, we employ it as an indicator of environmental quality in this work (Wackernagel, 1996). The United States struggles with meeting anticipated national energy efficiency, reducing carbon emissions, utilizing renewable energy sources, and achieving a decarbonized economy. Among industrialized countries, the ecological footprint (EFP) of the United States is 122 % greater than the natural shortage (Wackernagel and Beyers, 2019). The increasing environmental impact in America may be caused by excessive energy consumption (fossil fuels, oil, coal, and gas), biological capacity imports, and biological depletion. Global Footprint Network (GFN) estimates that 71 % of the US EFP represents a higher-risk economy (Global Footprint Network, 2019). Furthermore, the United States is rated as the second-highest nation globally in terms of EFP, behind only China. As a result of these considerations, this study selects the United States as the site for empirical research to create relevant and conclusive policies regarding ecological preservation that may serve as the supportive groundwork for developing countries. According to the International Energy Agency (2022), achieving zero global environmental pollution by 2050 would require a complete overhaul of energy production, transportation, and consumption patterns. In this sense, the nuclear energy industries have become a significant emphasis in climate change policy, providing long-term prosperity for both industrialized and rising nations. Similarly, nuclear energy, although always a complex subject regarding safety, effectiveness, and sustainability is crucial in achieving energy transition, conservation, and emissions reduction goals. To reduce environmental pollution, nuclear power has fewer negative externalities than any other kind of energy, emits equivalent levels of carbon dioxide as wind energy, and emits less than solar energy (World Nuclear Association., 2019). Additionally, nuclear power plants use the least land compared to fossil fuels and other renewable energy sources, freeing up more space for urban and agricultural growth as the world's population expands. Furthermore, the resource used, uranium, has a low environmental impact due to its high density, reducing the pollution brought on by its mining, transportation, use, and disposal. Nuclear energy provides various advantages for enhancing people's lives in terms of direct and indirect employment generation (OECD, 2018). Reducing the environmental footprint improves health and produces inexpensive, clean energy with lower Levelized costs than fossil (EIA, 2022, OECD, 2020). Furthermore, nuclear power reduces environmental pollution by increasing energy efficiency and generating low-carbon energy, creates minimal technical waste that can be repurposed, and protects vital natural resources (OECD, 2021). The circular carbon economy is aided by many recyclable wastes from decommissioned nuclear power stations (Giorgia Marino, 2021). The governments are actively believed to play a role in transition and circular carbon economy techniques to manage natural resources more sustainably, reduce waste, conserve biodiversity, maintain environmental quality, and achieve economic sustainability. However, more complicated and sophisticated export goods may imply higher energy consumption, leading to increased energy demands and added pollution. Investment in clean energy technologies, the development of alternative energy sources (i.e., sustainable energy and nuclear power sources), and the innovation of knowledge-intensive aspects of the economy must be given preference by investing in fixed capital and productive human capital (i.e., smart grids and bioenergy) to slow energy consumption growth and increase resource efficiency. The Economic Complexity Index (ECI) lies at the heart of the countryside explanation for the disparity in per capita income between rural and urban areas. This association is present throughout the preliminary stages of economic growth. The manufacturing process produces less pollution in the environment for essential agrarian economies. In subsequent phases of economic growth, the economics of industrialization and product variety become more complex. In this circumstance, low and medium ECI promote the deterioration of the ecosystem. After a specific threshold has been met, increased ECI may help avoid the worsening of the environment by developing technology, knowledge, and human capital. The medium and high ECI offers cleaner technology and information required to enhance environmental norms. The more sophisticated methodology allows the present work to produce more trustworthy and resilient findings against certain breaches of fundamental assumptions on econometric estimates (Romero and Gramkow, 2021). The present study contributes to this field of study in three ways. Firstly, in the context of the United States, none of the studies have evaluated the influence of nuclear energy on the EFP for the circular economy. This study will support the decision-making map for the government of the USA and throughout the world to establish nuclear energy policy from a circular economy perspective. Secondly, several works have used various economic indicators to explain environmental changes. None of them have combined economic complexity and technology improvement, which better measures energy efficiency and technological knowledge in the United States. Finally, this work utilizes two new estimation methods combining economics and machine learning qualities. Jordan and Philips (2018) developed the simulation Dynamic Autoregressive Distributive Lag (DARDL) technique. The DARDL simulation for the spurious effects of the examined variable is thus carried out and finds several problems. Further, an evaluation and creation of causal linkages among the variables are carried out using a machine learning method to strengthen the assertions made in this research. The kernel-based regularized least squares (KRLS) derivatives are also discussed. Accordingly, to the authors' knowledge, this study is the only one in literature utilizing the DARDL simulation and KRLS that examines the connection between EFP, ECI, NEC, and IMT for the case of the USA.

On prolif

1. NU: their tucker ev concedes prolif now bc trump which they cant solve for

2. T: Ceding leadership to adversaries

Jenner 23 (Edward Jenner is a former Postdoctoral Fellow in Technology and International Security at the UC Institute on Global Conflict and Cooperation (IGCC) based in Washington, D.C. September 2023, "POLICY PRIMER ON NUCLEAR ENERGY: UNDERSTANDING PROLIFERATION CONCERNS", Center for Global Security Research at the LLNL, https://cgsr.llnl.gov/sites/cgsr/files/2024-08/Primer-on-Nuclear-Energy-Proliferation-Concerns.pdf //. DOA: 3/2/25)JDE

How has the decline in U.S. nuclear reactor exports affected proliferation norms? The United States was historically considered a leader on nuclear safety, security, and safeguards (3S) standards. As U.S. nuclear exports have waned, so too has the influence of U.S. nuclear industry on 3S.7 **As China modernizes its nuclear arsenal, it is appearing to facilitate the flow of technology, material, and expertise from peaceful to military technology** as it pursues breeder reactors and reprocessing, both technologies with high utility for nuclear weapons. **This is concerning and increases proliferation risks.** Simultaneously, **to contend with U.S. influence and to reap the economic benefits, China is interested in exporting nuclear technology to other countries**, which will likely improve relationships as establishing nuclear export agreements with other countries effectively locks in economic partnerships lasting decades.13 However, **China is attracting potential nuclear deals by not adhering to as strict standards as the United States or other exporters**.7 One such example is the cooperation of China with Saudi Arabia for nuclear energy,14 when the United States has cautiously held out for commitments to not pursue enrichment and reprocessing with Saudi Arabia.

Additionally, Russia is looking to expand influence by offering nuclear exports including a suite of nuclear fuel cycle products. They are pursuing "Build-Own-Operate" style contracts in which they build the facility, own the facility and material, provide staff who operate the reactor and facility, and simply sell the electricity generated to the customer state. Doing so may create a great amount of reliance of the customer country onto the host country. **Russia is also interested in exports for countries without Additional Protocol agreements15 in place or with clear gaps in their capabilities and knowledge for nuclear regulatory oversight and infrastructure necessary to manage safe, secure, and safeguarded nuclear energy programs.**

LI and o/w sev: R/Ch more likely to encourage prolif of dangerous actors like Iran to counter the US

3. T: Ally cooperation

Columbia 20 (Columbia Center on Global Energy Policy: research center located within the School of International and Public Affairs at Columbia University. August 4, 2020, "Past, Present, and Future: Nuclear Energy Cooperation between the U.S. and Its Allies", Center on Global Energy Policy, https://www.energypolicy.columbia.edu/events/past-present-and-future-nuclear-energy-cooperation-between-us-and-its-allies/ . DOA March 17, 2025) CLS

The U.S. nuclear industry is being challenged by multiple factors: cheap natural gas, cost overruns in the first AP1000 pressurized water reactor construction projects, competition from Russia and (increasingly) China on foreign reactor bids, and more. **One element of a U.S. nuclear energy strategy could be to pursue deepened cooperation with key U.S. allies, such as Canada, the United Kingdom, France, Japan, and South Korea, in order to both preserve the existing reactor fleet and demonstrate the potential of advanced reactors as part of efforts to reduce greenhouse emissions and address climate change.** **The Center on Global Energy Policy will host a discussion on the past, present and future of nuclear energy cooperation between the U.S. and its allies, especially in response to the urgency and challenge of climate change.**

Alliances k2 stop prolif

Ford 21 (Christopher Ford: professor of international relations and strategic studies at Missouri State University Graduate School of Defense and Strategic Studies, also a Distinguished Visiting Fellow at the Pharos Foundation at Oxford. He is non-resident senior fellow at the Lawrence Livermore National Laboratory Center for Global Security Research. He was previously US assistant secretary of state for international security and non proliferation. April 7, 2021, "Reassuring U.S. allies and preventing nuclear proliferation", New Paradigms Forum –

International Security Policy since 2009, https://www.newparadigmsforum.com/reassuring-u-s-allies-and-preventing-nuclear-proliferation . DOA March 12, 2025) CLS

Let me begin, however, by pointing out the obvious. It is, I would argue, very clear that the United States' alliance relationships – both in Europe, centered upon the NATO Alliance, and in the Indo-Pacific through multiple bilateral alliances – are extremely important to U.S. national security, and to international peace and security more broadly. Indeed, I would contend that alliance relationships are perhaps more important to America today than at any time since the end of the Cold War. The United States, after all, does not now stand astride the world as a global "hyperpower" in the way that it did a generation ago, and we cannot alone meet all the challenges we face from revisionist great power competitors who seek to diminish, destabilize, and supplant us – and whose increasingly aggressive agendas are proving ever more dangerous to the free and open international order upon which global peace and prosperity have depended for a very long time. To succeed against these challenges, it is necessary to work with others, and this requires careful attention to our alliances and partnerships. Our alliance relationships have been critical bulwarks of international peace and security for many decades. Established most fundamentally to deter aggression, the United States' alliances have so far succeeded brilliantly in this task. Anchored in U.S. military power – in both our conventional strength and in the "extended" nuclear deterrence guarantees we have long offered military allies – these alliances faced down threats from the Soviet Empire in both Europe and Asia throughout the Cold War; they continue to deter belligerence by a resurgent Russia in more recent years; and they have protected East Asia from intimidation and aggression from the People's Republic of China and from North Korea all the while. And U.S. alliances have done even more for international peace and security than just deter aggression by militarized authoritarian states. America's alliances have also proven to be the world's most effective and successful nonproliferation tools. They have not merely deterred would-be aggressors, but they have also provided reassurance to those who might otherwise fear being the victims of such aggression – thus reducing the incentives that such threatened states would otherwise have felt to pursue the development of nuclear weaponry. It is actually quite striking how many of the countries the U.S. Central Intelligence Agency (CIA) once identified as being most likely to develop nuclear weapons in the postwar era ended up not doing so as a result of their relationships with the United States.

Specifically, as I pointed out in [a speech I gave in my previous job](), the growth and institutionalization of America's postwar alliance networks and other security relationships helped both persuade these countries that they did not need nuclear weaponry – because their existential security needs could be met through collective security, backed by U.S. conventional military power and nuclear weapons – and give Washington leverage over them that we used to insist that several nascent nuclear weapons development efforts be terminated. In fact, I'd be willing to wager **that U.S. alliance and security relationships are actually responsible for shutting down more previously active nuclear weapons development programs even than was the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) itself. As declassified memoranda from the late 1960s have documented, even the Soviets eventually came to appreciate the nonproliferation benefit of U.S. alliances during the negotiation of the NPT,** agreeing to accept an understanding of that Treaty that would permit NATO to continue with its arrangements for coordinating deployment of U.S.-controlled nuclear weapons as a means not only to deter the Warsaw Pact but also to prevent access by additional NATO allies to such devices. All in all, between deterring World War III and preventing a long-anticipated "cascade" of nuclear weaponization, we clearly have enormously compelling reasons to be grateful to U.S. alliance relationships.

4. T: Encouraging reliance

CACNP (Center for Arms Control and Non-Proliferation: nonprofit dedicated to eliminating the threats posed by nuclear, chemical, and biological weapons. N.D., "Fact Sheet: Nuclear Proliferation Risks in Nuclear Energy Programs", https://armscontrolcenter.org/nuclear-proliferation-risks-in-nuclear-energy-programs/ . DOA March 7, 2025) CLS

A major concern about the spread of peaceful nuclear energy programs is the possibility that facilities constructed for use in a nuclear energy program could eventually be used to produce nuclear weapons. Specifically, the key risk lies with the nuclear fuel cycle because facilities and technologies used in the enrichment and reprocessing of nuclear fuel can also be used to produce fissile material for use in nuclear weapons. These risks can be **mitigated by encouraging states to rely on the international market for their nuclear fuel supply, instead of acquiring proliferation-sensitive fuel cycle technologies.**

Reliance means US has leverage to deter prolif

5. T: Stopping cyber attacks

Renahan 21 (Lieutenant Colonel Timothy Renahan, USA, wrote this essay while attending the U.S. Army War College. It won the Strategy Article category of the 2021 Chairman of the Joint Chiefs of Staff Strategic Essay Competition. 10/14/21, "Realizing Energy Independence on U.S. Military

Bases", NDUP, https://ndupress.ndu.edu/Media/News/News-Article-View/Article/2808076/realizing-energy-independence-on-us-military-bases/ // DOA: 3/5/25)JDE

The Department of Defense (DOD) is the largest consumer of energy in the U.S. Government, yet it relies on the local electrical distribution systems and grids that surround each military base.2 The Army has realized that dependence on local energy grids creates a national security concern. Near-peer competitors such as Russia and China are working to exploit our aging infrastructure to gain advantage in possible future conflict and destabilize day-to-day operations.3 Rogue nations such as Iran and North Korea have undertaken offensive cyber acts to asymmetric benefit, and they have disrupted U.S. ability to continue to pressure them economically.4 Therefore, military bases should have independent energy production methods to prevent loss of capability and to provide emergency service if the local energy grid is compromised. DOD is currently exploring renewable energy initiatives and nuclear possibilities, such as small modular reactor (SMR) technology, which could offer options for energy independence that are scalable and environmentally friendly. This article focuses on domestic military bases and the energy vulnerabilities associated with local grids; it does not consider forward-deployed locations or military bases overseas. As energy technologies evolve, now is the time to invest future funding to reduce vulnerability of domestic military bases to attack and ensure energy independence. Risks to National Security DOD has publicly identified that a significant vulnerability to U.S. military bases is the local energy infrastructure.5 The military installations themselves are currently positioning physical and cyber security measures, but illicit actors do not need to penetrate the bases.6 Targeting the external power distribution system that provides a base its electricity is just as damaging as targeting the base itself. In 2019, more than 12 utilities companies across the country were targeted via cyber attack.7 This pattern of sustained pressure by illicit actors on infrastructure, including electrical nodes, is predicted to continue—if not increase.8 The Department of Energy reports that grids have been tested by external threats for years. In 2014 alone, the energy sector reported 46 individual incidents, a significant number of them being advanced persistent threats.9 Near-peer competitors such as Russia and China seek to manipulate our aging infrastructure to gain advantage in future possible conflict and destabilize day-to-day capability.10 Nonstate actors, such as terrorist and transnational criminal organizations, are also working to attack grid facilities as a way to challenge perceptions of U.S. governance and stability.11 Complicating the issue is the way power is managed and regulated: The Federal Energy Regulatory Commission has "jurisdiction over the reliability

of the bulk power grid," but the states have responsibility for electrical distribution.12 Such division of labor creates an issue of security standards across energy platforms and can expose cracks in mutually supporting security strategies.

Cyber attacks = miscalc!

Fowler 21 (Fowler is a director of strategic threat at darktrace and spent the last 15 years as a CIA officer developing global cyber and technical operations and strategies. He was previously an officer in the US marine corps, and is a graduate of Harvard Business School's executive education advanced management propgram. He also has a master's in international security studies from the Fletcher school. 7-6-2021, "Unintended Consequences and Miscalculation: When Cyber Attacks Go Too Far" Darktrace https://cybersecurityasean.com/expert-opinions-opinion-byline/unintended-consequences-and-miscalculation-when-cyber-attacks-go-too , DOA 8-7-2023) CLS

Misjudging the impact and collateral damage of a cyber attack can lead to a range of unintended ramifications, from a cybercrime group feeling increased heat from law enforcement **to a nation-state escalating a conflict greater than they intended.** It is for this reason that many ransomware groups historically have tended to keep their affairs under the radar. Over 70% of ransomware attacks target SMBs. Unfortunately, while many cyber-crime groups pledge to avoid larger bodies like hospitals and critical infrastructure, the allure of fast payouts for record-breaking ransoms has led to the healthcare sector, even vaccine efforts, being a heavy target for ransomware actors. Following the incident at Colonial Pipeline, and no doubt in the fear of moving up the FBI's Most Wanted list, a major Ransomware-as-a-Service (RaaS) group, REvil, announced the following policy: Work in the social sector (health care, educational institutions) is prohibited; It is forbidden to work on the gov-sector (state) of any country. Organised cybercrime groups often stress that they are apolitical and motivated solely by financial gain. However**, thanks to today's extensive and interconnected digital systems, attacks can easily spill over into geopolitical tensions,** encouraging governments to issue executive orders and pushing cyber-threats into the headlines – all bad business for criminal groups. And if a threat actor gets in over their head, they either need to lay low and rebrand in what is known as an 'exit scam', as ransomware groups such as Maze and Jokeroo have done in the past, or they're shut down completely, as seen in the disruption of the Emotet botnet at the beginning of this year. **The effects of a cyber attack are becoming increasingly difficult to predict and control.** The reason for this is twofold. The first is this idea of interconnectivity. We live in a digitised world which is so interlinked that an attack on one server can have global consequences, whether that's reverberations down the supply chain, IT converging with OT, or a cyber threat against one country affecting the world. More isolated than federal bodies, the private sector will most often take the brunt of this collateral damage. Just take NotPetya – where a targeted attack against Ukrainian infrastructure went into the wild paralysing factories across the globe and costing shipping company Maersk US$300 million. The second reason is easier access to more sophisticated tools. The commercialisation of cyber-crime has enabled less

advanced actors to rent state-of-the-art malware and launch campaigns with
speed and with ease. In fact, the Colonial Pipeline attack was likely
orchestrated by an affiliate who had paid for the DarkSide malware. This makes
it far more challenging to monitor who is being targeted. When it comes to RaaS, even the developers probably do not know for certain how their
malware will be used. When preparing any kind of cyber attack, the intelligence
that an actor has going into the target environment is rarely 100%. If the
intention is to impact a single component of a bank, for example, but the
attacker fails to realise that a nearby hospital relies on that same electrical
grid, the situation can escalate very quickly. And when it's a low-skilled
attacker with little regard or understanding of what a high-powered tool can
do, **miscalculations become alarmingly easy.**

o/w prob: miccalc most likely route to war
o/w prob: cyber attacks more likely to cause war bc its unattributable whereas theres surv mechanisms to monitor prolif which avoids miscalc
o/w prob: cyber attacks are more probable bc its easy to avoid accountability whereas theres many international ramifications for prolif
o/w t/f: cyber attack tech exists and can happen instantly, prolif takes decades