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

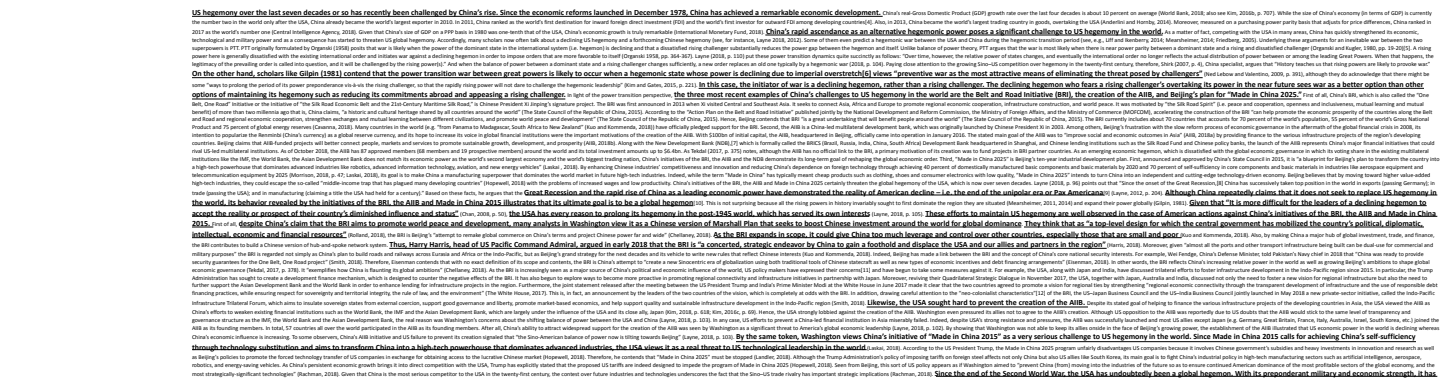
Hale 02 (Hale, Cameron Edward (The University of Wisconsin - Madison). 2002, "Energy and hegemonic power", Ads, https://ui.adsabs.harvard.edu/abs/2002PhDT.....127H/abstract, DOA 3/11/25) RK

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



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

Arbatov 20(Alexey Arbatov, head of the Center for International Security at the Primakov National Research Institute of World Economy and International Relations, 12-4-2020, "Nuclear Deterrence: A Guarantee for or Threat to Strategic Stability?," SpringerLink, https://link.springer.com/chapter/10.1007/978-94-6265-419-8_5, DOA: 7/12/21)ET

Nevertheless, these concepts, their dynamics, and their dialectical interrelationship create new problems time and again. They give rise to paradoxes that, were it not a life-and-death matter for modern civilization, could be considered intellectually fascinating. But, unfortunately, these concepts concern actual matters of life and death. **In the current military and political environment, it is no longer inconceivable that war between the United States and Russia could break out in just a few days in the event of a crisis. Such a conflict might culminate with an exchange of nuclear strikes taking as long as just a few hours. During those hours, hundreds of millions of people in the northern ehemisphere would be killed, and everything created by human civilization in the last thousand years would be destroyed. The direct effects would be irreversible, and the secondary effects would likely kill the rest of the world's population within a number of years, or at least send the remaining population back into a prehistoric existence. The prevention of nuclear war is an indispensable condition for the survival of human civilization, and it is inextricably linked to the concepts of nuclear deterrence, strategic stability, nuclear disarmament, and non-proliferation.** It might seem that all of the above goes without saying, and that all of this has long been accepted both in theory and practice by politicians, military leaders, civilian experts, and the enlightened public of the world's advanced nations. Over the past three decades, the nuclear arsenals of Russia and the United States have been reduced substantially—both in terms of the number of warheads and in terms total of destructive power. Yet despite all of this, **the danger of nuclear war is today much greater than it was in the late 1980s.**

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

Chen 21 (About the Author: Dr. Janet Chen is a Contractor in the Bureau of International Security and Nonproliferation, and was an AAAS (American Association for the Advancement of Science) Science and Technology Policy Fellow. Nov 24 2021, "Peaceful Uses of Nuclear Science and Technology in Food and Agriculture", US Department of State, https://2021-2025.state.gov/peaceful-uses-of-nuclear-science-and-technology-in-food-and-agriculture/#:~:text=Nuclear%20science%20and%20technology%20play,been%20proven%20safe%20and%20effective., DOA 3/10/25) RK

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

Heslin et al 20 (Alison Heslin, Michael Puma, Philippe Marchland. 1Center for Climate Systems Research, Earth Institute, Columbia University, New York, NY, United States. 2NASA Goddard Institute for Space Studies, New York, NY, United States. 3Institut de Recherche sur les Forêts, Université du Québec en Abitibi-Témiscamingue, Rouyn-Noranda, QC, Canada. 3/20/20, "Simulating the Cascading Effects of an Extreme Agricultural Production Shock: Global Implications of a Contemporary US Dust Bowl Event", Frontiers in Sustainable Food Systems, https://www.frontiersin.org/articles/10.3389/fsufs.2020.00026/full //. DOA: 7/19/22)JDE

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 Arbatov.

Thus, we affirm.

REBUTTAL:

On spark

On no new warrants

1. their strat is reading a bunch of reasons why it's bad which we couldn't predict, we should be able to read a similar number of warrants as them

On arbatov

1. It does scientific authors its literalrally published in a science textbook
2. Conceded warrant abt civilization collapsing, check the highlight

On islands

1. NL: Their analysis that 100 people living on a remote island after a nuclear war would survive is flawed because even if you don't die from immediate radiation, you do not have anything that means they can keep living, they don't have access to food, clean water, medical treatment, or any modern infrastructure so they either a) die immediately b) die before they can repopulate or c) their kids die

2. NL: Not enough ppl to repopulate

Bradshaw 18 (Corey Bradshaw is a Matthew Flinders Fellow in Global Ecology, Flinders University, March 22 2018, "Why populations can't be saved by a single breeding pair", Phys.org, https://phys.org/news/2018-03-populations-pair.html#:~:text=Repopulating%20the%20world%20after%20the%20apocalypse&text=However%2C%20to%20retain%20evolutionary%20potential,population%20of%202%2C500%20to%205%2C000., DOA 2/24/23) RK

So let's do the maths. **Fifty effective individuals – the IUCN standard for avoiding inbreeding – equals a total population of 250 to 500. This means that, in a hypothetical apocalypse, humanity would need a lot more than a handful of survivors to repopulate effectively. However, to retain evolutionary potential – to remain genetically flexible and diverse – the IUCN criteria suggest we would need at least 500 effective individuals. That requires a population of 2,500 to 5,000**. Some preliminary results emerging from ongoing research at the Centre of Excellence for Australian Biodiversity and Heritage appear to confirm this. Using both ancient DNA techniques and palaeo-demographic models, we have estimates of a minimum effective population size for Aboriginal Australians when they first appeared of about 250. This means at least several thousand had to arrive around the same time to manage to colonise the entire continent successfully. Of course, not every species has the same ratio of effective to total population size, and not all populations necessarily need 5,000 individuals to survive. But without being able to measure the true ratio for a specific population, it helps to default to the average situation. **The idea that 50 individuals is enough to avoid inbreeding depression comes largely from laboratory populations that probably do not describe the situation for populations living in wild environments**. In species as varied as houseflies and pinkfairies, populations substantially greater than 50 individuals still succumb to inbreeding depression. So, **in many cases, 50 effective individuals is in fact too low to ensure no inbreeding depression occurs. It may be that 100 effective individuals is closer to the true minimum, without even considering how populations respond to evolutionary challenges**. So, sensational analogies about the apocalypse aside, do human beings follow the same rule? We aren't entirely sure, but **evidence suggests that most species in vastly different groups roughly follow the same trend. An emerging rule of thumb is that when a population starts to dip below several thousand individuals, it has a high likelihood of going extinct.**

the population is 8 billion – this is a drop in the bucket

Their idea of repopulating with only 100 people is bad because it leads to inbreeding which causes a host of health problems such as hemophilia and ultimately death

3 this assumes prebuilt bunkers on islands AND that North Sentinel Island has access to submarines which they haven't proven

4. Islands environment won't be the same – climactic args mean the warmth of the ocean goes away, no sunlight means food can't grow

On alt foods

1. The ev only accounts for sun blocking not radiation which makes food unable to survive

On adaptations

1. Only small amt of ppl could seize food which causes inbreeding and eventually death

On hazardous tech

1. T: Living like pre-industrial societies fails- extinction risks are inevitable and science is key

Pethokoukis 21 (James Pethokoukis, fellow at the American Enterprise Institute and an official CNBC contributor, 26 November 2021, "America took one small step toward saving humanity this week", Faster Please, https://fasterplease.substack.com/p/-america-took-one-small-step-toward, DOA 4/15/2024) ESR

Not only does **planetary defense make the** strong **case for further** investment in space, but also for further scientific discovery, **technological invention**, and commercial innovation — all of which leads to more economic growth and wealth creation. **Stagnation**, or even "de-growth," **is a recipe for human extinction**, as well as needless suffering from poverty, illness, ecological collapse, and the decline of human freedom. Of course, killer comets aren't the only threat out there. In 2020's excellent The Precipice: Existential Risk and the Future of Humanity, philosopher Toby Ord explores various natural and manmade threats to modern civilization and humanity's existence. Among them: **asteroids and comets, supervolcanic eruptions, stellar explosions such as supernovas and gamma-ray bursts near our solar system**, nuclear war, climate change, pandemics natural and engineered, hostile AI, a totalitarian surveillance state, and extraterrestrial contact. Overall, Ord figures there's a 1-in-6 chance of an existential catastrophe over the next 100 years. So what to do? Ban AI and CRISPR? Reduce our electromagnetic signature so we don't attract ETs? **Attempt to live like pre-industrial societies?** Maybe, but **exploding stars and space rocks don't care** about any of that stuff. Such a path also means renouncing humanity's potential. In his book The Beginning of Infinity: Explanations That Transform the World, UK physicist David Deutsch writes about the possibility for an "appallingly narrow escape" from the sorts of scary scenarios Ord outlines: We have such a chance because we are able to solve problems. **Problems are inevitable**. We shall always be faced with the problem of how to plan for an unknowable future. We shall never be able to afford to sit back and hope for the best. Even if our civilization moves out into space in order to hedge its bets, as Rees and Hawking both rightly advise, a gamma-ray burst in our galactic vicinity would still wipe us all out. Such an event is thousands of times rarer than an asteroid collision, but when it does finally happen **we shall have no defence against it without a great deal more scientific knowledge and an enormous increase in our wealth.** DART is a start. But as the NASA scientist said, we can do better. Indeed, we must do better. And that means becoming richer and smarter.

On s risks

1. Death is infinite. If you die, future generations not yet have functionally died, and so on.
2. Death is worse than suffering because of reversibility. The condition could improve over time in which case you remove the possibility of a happy life, if you die it is over forever.
3. You have no idea what "infinite suffering" means. There is no contextualization for what is causing the suffering, how bad it is, if everyone experiences it, etc.
4. They have not proven that a majority of people would be suffering. Even their authors require that the majority of people be suffering more than happy to justify this argument.
5. T: Eugenics. Their argument justifies the powerful killing the oppressed because the powerful can determine they are suffering and thus would be better to die. This outweighs their argument:
    a. Link in: creates incentives for elites to make people suffer so they can kill them and thus creates more suffering than there was before
    b. Severity: This was used to justify the holocaust, one of the worst examples of modern suffering. Prefer this to their vague arguments about the future.
    c. Safety. Could presumably be used to justify why certain debaters must die and jeopardizes their safety in the debate.
6. Suffering is entirely subjective. What causes it? What is the brightline for it? We all feel pain in various circumstances, is that suffering? Absolutely no clue what the impact actually is or how it is caused. Death is much worse because it is final, and outweighs on probability because they do not contextualize their link.

On AGI

1. NL- AI won't cause human extinction because 1) technology with self-intent has yet to be built now or in the future 2) government checks back – from Stanford's 100 yr study

Meek 16 (ANDY MEEK is a reporter at BGR and has been featured in Forbes, The Guardian, Financial times specializing in technology and entertainment, 19 November 2016, "Robots Won't Try To Kill Us, Says Stanford's 100-Year Study Of AI" Fast Company, https://www.fastcompany.com/3065703/robots-wont-try-to-kill-us-says-stanfords-100-year-study-of-ai DOA: 1/22/23) LLO

For many people, talking about artificial intelligence and its implications for the future of humanity inspires the conversational equivalent of that internet argument about the dress being blue or gold. Some people will see abundant possibility; others, the period at the end of humanity's story, as they conflate AI with killer robots and super-intelligent machines that will come to regard us as pets—or worse. **A Stanford University-hosted project is under way to look past all that—past the pop-culture takes on AI,**

the warnings from tech thinkers, and the breathless hype about assistive AI tools in our phones and other devices. The project was set up to take the long view of AI–a very, very long view. Its formal name: One Hundred Year Study on Artificial Intelligence. The study is an ongoing endowed project, and its goal is for a standing committee of scientists to regularly commission reports that take expansive looks at how AI will touch different aspects of daily life. The first of those reports, the 28,000-word "Artificial Intelligence and Life in 2030," has just been released. It's the result of a yearlong dive into the likely effects that AI advancements will have on a typical North American city a little more than a decade from now. "The portrayal of artificial intelligence in the movies and in literature is fictional," says Peter Stone, a computer scientist at the University of Texas at Austin who was the lead author on the 2030 report. "**It's a misconception of people . . . that AI is one thing. We also found that the general public is either very positively disposed to AI and excited about it, sometimes in a way that's unrealistic, or scared of it and saying it's going to destroy us, but also in a way that's unrealistic."** The study presents AI as something a bit like the modern smartphone**. It's not that it's literally taken over your life, but most people at the same time can't imagine functioning without one. As part of their analysis, Stone and his coauthors drill down into several aspects of future urban life where they say AI is either already upending the status quo or has the potential to do so.** And while they avoid being prescriptive, preferring instead to provide a kind of jumping-off point for scientists, the public, lawmakers, and industry, AI in the kind of future they describe is pervasive, wielding significant influence. In sectors that range from transportation to health care, education, and the workplace, the study presents AI as something a bit like the modern smartphone. It's not that it's literally taken over your life, but most people at the same time can't imagine functioning without one. Says the report on transportation: "Transportation is likely to be one of the first domains in which the general public will be asked to trust the reliability and safety of an AI system for a critical task. Autonomous transportation will soon be commonplace and, as most people's first experience with physically embodied AI systems, will strongly influence the public's perception of AI." In health care, the study argues that the current health care delivery system "remains structurally ill-suited" for rapidly deploying high-tech advances and AI capabilities. Looking ahead another 15 years, though, it foresees a time when sufficiently advanced AI systems "coupled with sufficient data and well-targeted systems" take away some computational types of tasks from physicians. AI will also make it faster to extract insights from population-level data and make more personalized diagnoses and treatments possible. "Looking ahead, many tasks that appear in health care will be amenable to augmentation but will not be fully automated. For example, robots may be able to deliver goods to the right room in a hospital, but then require a person to pick them up and place them in their final location." Policing and public safety is another area where the study finds that potential abounds, though it's fraught with complexity. Among the pros: AI could help policing become more targeted. As AI in fields like image quality and facial recognition improves, cameras will better help with crime prevention and prosecution "through greater accuracy of event classification" and in the processing of video to ferret out anomalies. AI can also help law enforcement with social network analysis. "Law enforcement agencies are increasingly interested in trying to detect plans for disruptive events from social media, and also to monitor activity at large gatherings of people to analyze security," the study argues. "There is significant work on crowd simulations to determine how crowds can be controlled. At the same time, legitimate concerns have been raised about the potential for law enforcement agencies to overreach and use such tools to violate people's privacy." And when it comes to employment and the workplace, the study sees AI as replacing tasks rather than jobs, while also helping to create new kinds of jobs. **The authors conclude by saying they've found no cause for concern that AI poses an imminent threat to humanity. No machines with self-sustaining long-term goals and intent have been developed, they write, nor are they likely to be in the near future.** The 2030 report comes at a time when other institutions and corporations are dedicating financial resources and the attention of top researchers and scientists to similar studies into AI's influence on our future. **The University of Cambridge, for example, has opened a new research center to study artificial intelligence.** A few weeks after the release of the Stanford report, five tech companies—Amazon, IBM, Microsoft, Google, and Facebook—collectively announced their launch of a nonprofit called The Partnership on Artificial Intelligence to Benefit People and Society. **No machines with self-sustaining long-term goals and intent have been developed, nor are they likely to be in the near future.** A report the White House published in October on AI, "Preparing for the Future of Artificial Intelligence," argues that there's a clear role for the government to play, a conclusion the Stanford team also makes in the 2030 report. **"One of our recommendations is to ensure that there are people at all**

levels of government that have expertise in artificial intelligence," Stone says. "So that if and when there are policy decisions that either give a green light to some technology in a particular sector or limit it in some way, that it's people who have a realistic view of what's possible and not possible who are helping make those decisions. "By either educating people in the policy decisions or trying to get people with AI expertise newly into those positions, we think that'll maximize the chances of the correct decisions being made from a legal and policy perspective." When the One Hundred Year Study leadership convenes a study panel again in a few years, it will have several items on the agenda. One task will involve an assessment of the state of AI at that point and its progression since the first report. The studies will be continuously knitted together to form a continuum of understanding—a body of thought and research about the field that tries to also take the popular consciousness somewhere that movies and dark visions of the future don't. **On that last point, "no" is the answer Stone gives to the question of whether we should be scared of robots getting smart enough to destroy us or of some other nefarious byproduct associated with AI. "Just because we have a car that can drive itself, that doesn't mean we'll also have a robot that can fold your laundry or do something else useful for you," Stone says. "Those tasks each require sustained research effort, and . . . it's not that we're better at solving one, so we automatically become better at solving others. That's the leap people mistakenly make, and it's why they become scared when there's a breakthrough in one area. They say, 'Oh, well. All of a sudden robots will now be able to do a lot of things we don't want them to do and they'll be able to do them spontaneously.'** "Any technology has upsides and potential downsides and can be used by people in evil ways," he continues. "On balance, I'm highly optimistic that artificial intelligence technologies are going to improve the world."

2. NL- Evil AI can't be built, full knowledge of the brain is impossible

Dormehl 22 (Luke Dormehl, tech writer, 25 September 2022, "Why AI will never rule the world", Digital Trends, https://www.digitaltrends.com/computing/why-ai-will-never-rule-the-world/, DOA 2/24/2023) ESR

Co-authors University at Buffalo philosophy professor Barry Smith and Jobst Landgrebe, founder of German AI company Cognotekt argue **that human intelligence won't be overtaken by "an immortal dictator" any time soon — or ever**. They told Digital Trends their reasons why. Digital Trends (DT): How did this subject get on your radar? Jobst Landgrebe (JL): I'm a physician and biochemist by training. When I started my career, I did experiments that generated a lot of data. I started to study mathematics to be able to interpret these data, and saw how hard it is to model biological systems using mathematics. There was always this misfit between the mathematical methods and the biological data. In my mid-thirties, I left academia and became a business consultant and entrepreneur working in artificial intelligence software systems. I was trying to build AI systems to mimic what human beings can do. I realized that I was running into the same problem that I had years before in biology. Customers said to me, 'why don't you build chatbots?' I said, 'because they won't work; we cannot model this type of system properly.' That ultimately led to me writing this book. Professor Barry Smith (BS): I thought it was a very interesting problem. I had already inklings of similar problems with AI, but I had never thought them through. Initially, we wrote a paper called 'Making artificial intelligence meaningful again.' (This was in the Trump era.) It was about why neural networks fail for language modeling. Then we decided to expand the paper into a book exploring this subject more deeply. DT: Your book expresses skepticism about the way that neural networks, which are crucial to modern deep learning, emulate the human brain. They're approximations, rather than accurate models of how the biological brain works. But do you accept the core premise that it is possible that, were we to understand the brain in granular enough detail, it could be artificially replicated – and that this would give rise to intelligence or sentience? JL: The name 'neural network' is a complete misnomer. The **neural networks** that we have now, even the most sophisticated ones, **have nothing to do with the way the brain works. The view that the brain is a set of interconnected nodes in the way that**

neural networks are built is completely naïve. If you look at the most primitive bacterial cell, we still don't understand even how it works. We understand some of its aspects, but **we have no model** of how it works **– let alone a neuron, which is much more complicated, or billions of neurons interconnected**. I believe **it's scientifically impossible to understand how the brain works**. We can only understand certain aspects and deal with these aspects. We don't have, and we will not get, a full understanding of how the brain works. **If we had a perfect understanding** of how each molecule of the brain works, then **we could** probably **replicate it**. That would mean **put**ting **everything into mathematical equations**. Then you could replicate this using a computer. The problem is just that **we are unable to write down and create those equations**. BS: Many of the most interesting things in the world are happening at levels of granularity that we cannot approach. **We just don't have the imaging equipment, and we probably never will have the imaging equipment, to capture most of what's going on at the very fine levels of the brain.** This means that **we don't know**, for instance**, what is responsible for consciousness**. There are, in fact, a series of quite interesting philosophical problems, which, according to the method that we're following, will always be unsolvable – and so we should just ignore them. Another is the freedom of the will. **We are very strongly in favor of the idea that human beings have a will**; we can have intentions, goals, and so forth. **But we don't know whether or not it's a free will**. That is an issue that has to do with the physics of the brain. As far as the evidence available to us is concerned, **computers can't have a will**. DT: The subtitle of the book is 'artificial intelligence without fear.' What is the specific fear that you refer to? BS: That was provoked by the literature on the singularity, which I know you're familiar with. Nick Bostrom, David Chalmers, Elon Musk, and the like. When we talked with our colleagues in the real world, it became clear to us that there was indeed a certain fear among the populace that AI would eventually take over and change the world to the detriment of humans. We have quite a lot in the book about the Bostrum-type arguments. The core argument against them is that **if the machine cannot have a will, then it also cannot have an evil will. Without an evil will, there's nothing to be afraid of**. Now, of course, we can still be afraid of machines, just as we can be afraid of guns. But that's because the machines are being managed by people with evil ends. But then **it's not AI that is evil; it's the people who build and program the AI**

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1. Wont cause xtinction – cosmic rays prove

Saplakoglu 18 (Yasemin Saplakoglu, staff writer at Live Science, covering health, neuroscience and biology. Her work has appeared in Scientific American, Science and the San Jose Mercury News, 5 October 2018, "No, Particle Accelerators Will Not Destroy the Planet, But Humans Might", Live Science, https://www.livescience.com/63759-future-threats-to-humanity.html, DOA 1/22/23) ESR

The future could be glorious or grim, and the gust of wind that tips things one way or another is us — the humans of the 21st century. "The stakes are very high this century," said British cosmologist Martin Rees. "It'sthe first century when human beings … can determine the planet's future." [10 Technologies That Will Transform Your Life] For the past couple of days, news **outlets** have been reporting that Rees' new book "On

the Future: Prospects for Humanity" (Princeton University Press, 2018) makes a rather spectacular **claim: If things go wrong, particle accelerators that slam subatomic particles together at immense speeds** — like the Large Hadron Collider near Geneva, Switzerland,— **could turn Earth into a dense sphere or black hole.** In fact, Rees told Live Science in a recent interview, his book claims the opposite: **The probability of this happening is very, very low. The idea of the LHC forming mini-black holes has been circulating for a while and is not something to worry about**, he said. "I think people quite rightly thought about this question before they did the experiments, but they were reassured," he said. The reassurance mainly comes from the fact that **nature already performs such experiments — to an extreme. Cosmic rays, or particles with much higher energies than those created in particle accelerators, frequently collide in the galaxy, and haven't yet done anything disastrous like rip space apart,** Rees said. "It's not stupid to think about these things, but on the other hand, they're not serious worries," he said. But in contrast, "if you're doing something where you have no guidance from nature, then you've got to be a bit careful."

On SETI

1. Drake equation proves no aliens

Johnson 18 (Stephen Johnson, Managing Editor of Big Think, 25 June 2018, "Are we alone in the universe? New Drake equation suggests yes", Big Think, https://bigthink.com/surprising-science/are-we-the-only-intelligent-life-in-the-universe-updated-drake-equation-suggests-yes/, DOA 4/15/2024) ESR

This is known as **the Fermi paradox**. It's **based on mathematical ideas like the Drake equation**, which was devised to estimate the number of detectable civilizations in the Milky Way. Scientists use the equation by multiplying seven variables, as Elizabeth Howell outlined for Space: N = R* • fp • ne • fl • fi • fc • L N = The number of civilizations in the Milky Way Galaxy whose electromagnetic emissions are detectable. R* = The rate of formation of stars suitable for the development of intelligent life. fp = The fraction of those stars with planetary systems. ne = The number of planets, per solar system, with an environment suitable for life. fl = The fraction of suitable planets on which life actually appears. fi = The fraction of life bearing planets on which intelligent life emerges. fc = The fraction of civilizations that develop a technology that releases detectable signs of their existence into space. L = The length of time such civilizations release detectable signals into space. The Drake equation is incredibly speculative, or, as astronomer Jill Tarter once said, it's "a wonderful way to organize our ignorance." It remains a puzzling problem. However, a new paper from scientists at the Future of Humanity Institute at Oxford University **provides an updated Drake equation**, one that **incorporates "realistic distributions of uncertainty" and "models of chemical and genetic transitions on paths to the origin of life**." By doing so, the researchers say **they dissolve the Fermi paradox and provide even more reason to think we're alone in the universe. The updated equation effectively takes each variable and combines many historical estimates that scientists have used to create an uncertainty range**, one that highlights just how much scientists still don't know, as study author Anders Sandberg told Universe Today: "Many parameters are very uncertain given current knowledge. While we have learned a lot more about the astrophysical ones since Drake and Sagan in the 1960s, we are still very uncertain about the probability of life and intelligence. When people discuss the equation it is not uncommon to hear them say something like: 'this parameter is uncertain, but let's make a guess and remember that it is a guess', finally reaching a result that they admit is based on guesses. "But this result will be stated as single number, and that anchors us to an *apparently* exact estimate—when it should have a proper uncertainty range. **This often leads to overconfidence**, and worse, **the Drake equation is very sensitive to bias: if you are hopeful a small nudge upwards in several uncertain estimates will give a hopeful result, and if you are a pessimist you can easily get a low result**." After Sandberg and his colleagues combined these uncertainties, **the results showed a distribution pattern of the likelihood that humanity is alone in space.** "We found that **even using the guesstimates in the literature** (we took them and randomly combined the parameter estimates) **one can have a situation where the mean number of**

civilizations in the galaxy might be fairly high—say, a hundred—**and yet the probability that we are alone in the galaxy is 30%**! The reason is that there is a very skew distribution of likelihood. "If we instead try to review the scientific knowledge, things get even more extreme. This is because **the probability of getting life and intelligence on a planet has an *extreme* uncertainty given what we know**—we cannot rule out that it happens nearly everywhere there is the right conditions, but we cannot rule out that it is astronomically rare. This leads to an even stronger uncertainty about the number of civilizations, drawing us to conclude that there is a fairly high likelihood that we are alone. However, we *also* conclude that we shouldn't be too surprised if we find intelligence!"

1. On AI -- Tech development in the future will improve the human condition ,reduce aggregate suffering because the cost of reducing suffering will decrease with new tech – multiple examples prove

West 17 (Ben West previously was the founder/CTO of Health eFilings (acquired by Alpha II) and founder/CEO of Statistok (acquired by Rei Exitus, MB). He was also the software architect of an analytics platform used by almost every major healthcare organisation in the US, and has served on numerous government committees related to health care and interoperability. 7/19/17. "An Argument for Why the Future May Be Good", EA, https://forum.effectivealtruism.org/posts/kNKpyf4WWdKehgvRt/an-argument-for-why-the-future-may-be-good //. DOA: 9/8/24)JDE

In late 2014, I ate lunch with an EA who prefers to remain anonymous. I had originally been of the opinion that, should humans survive, the future is likely to be bad. He convinced me to change my mind about this. I haven't seen this argument written up anywhere and so, with his permission, I'm attempting to put it online for discussion. A sketch of the argument is: **Humans are generally not evil, just lazy Therefore, we should expect there to only be suffering in the future if that suffering enables people to be lazier The most efficient solutions to problems don't seem like they involve suffering Therefore, as technology progresses, we will move more towards solutions which don't involve suffering Furthermore, people are generally willing to exert some (small) amount of effort to reduce suffering As technology progresses, the amount of effort required to reduce suffering will go down Therefore, the future will contain less net suffering Therefore, the future will be good** My Original Theory for Why the Future Might Be Bad There are about ten billion farmed land animals killed for food every year in the US, which has a population of ~320 million humans. The farmed animals are overwhelmingly living in factory farming conditions, which results in enormous cruelties, and probably have lives which are not worth living. Since (a) farmed animals so completely outnumber humans, (b) humans are the cause of their cruelty, and (c) humans haven't caused an equal/higher # of beings to lead happy lives, human existence is plausibly bad on net. Furthermore, technology seems to have instigated this problem. Animal agriculture has never been great for the animals which were being slaughtered, but there was historically some modicum of welfare. For example: chickens had to be let outside at least some of the time, because otherwise they would develop vitamin D deficiencies. But with the discovery of vitamins and methods for synthesizing them, chickens could now be kept indoors for their entire lives. Other scientific advancements like antibiotics enabled them to be packed densely, so that now the average chicken has 67 inches of space (about two thirds the size of a sheet of paper). It's very hard to predict the future, but one reasonable thing you can do is guess that current trends will continue. Even if you don't believe society is currently net negative, it seems fairly clear that the trend has been getting worse (e.g. the number of suffering farmed animals grew much more rapidly than the [presumably happy] human population over the last century), and therefore we should predict that the future will be bad. His Response **Technology is neither good nor bad, it's merely a tool which enables the people who use it to do good or bad things**. In the case of factory farming, it it seemed to me (Ben) that people overwhelmingly wanted to do bad things, and therefore technological progress was bad. **Technological progress will presumably continue, and therefore we might expect this ethical trend to continue and the future to be even worse than today.** He pointed out that this wasn't an entirely accurate way of viewing things: **people didn't actively want to cause suffering, they are just lazy, and it turns out that the lazy solution in this case causes more suffering.** So the key question is: **when we look at problems that the future**

will have, will the lazy solution be the morally worse one? It seems like the answer is plausibly "no". To give some examples: **Factory farming exists because the easiest way to get food which tastes good and meets various social goals people have causes** cruelty. Once we get more scientifically advanced though**, it will presumably become even more efficient to produce foods without any conscious experience at all by the animals** (i.e. clean meat); at that point, the lazy solution is the more ethical one. (This arguably is what happened with domestic work animals on farms: we now have cars and trucks which replaced horses and mules, making even the phrase "beat like a rented mule" seem appalling.) **Slavery exists because there is currently no way to get labor from people without them having conscious experience.** Again though, this is due to a lack of scientific knowledge: there is no obvious reason why conscious experience is required for plowing a field or harvesting cocoa, and therefore **the more efficient solution is to simply have nonconscious robots do these tasks.** (This arguably is what happened with human slavery in the US: **industrialization meant that slavery wasn't required to create wealth in a large chunk of the US, and therefore slavery was outlawed**.) Of course, this is not a definitive proof that the future will be good. One can imagine the anti-GMO lobby morphing into an anti-clean meat lobby as part of some misguided appeal to nature, for example. But **this does give us hope that the lazy – and therefore default – position on issues will generally be the more ethical one, and therefore people would need to actively work against the grain in order to make the world less ethical. If anything, we might have some hope towards the opposite: a small but nontrivial fraction of people are currently vegan, and a larger number of people spend extra money to buy animal products which (they believe) are less inhumane**. I am not aware of any large group which does the opposite (go out of their way to cause more cruelty to farmed animals). Therefore, **we might guess that the average position of people is slightly ethical and so people would be willing to not just be vegan if that was the cheaper option, but also be willing to pay a small amount of money to live more ethically.** The same thing goes for slavery: a small fraction of consumers go out of their way to buy slave-free chocolate, with no corresponding group of people who go out of their way to buy chocolate produced with slavery. Once machines come close to human cocoa growing abilities, we would expect chocolate industry slavery to die off.