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1NC -- Markets

Oil markets are stabilizing now, Wang 25’

Frances Wang [a reporter], 3-26-2025, "Commodity markets today: Oil Price Steadies as Global Supply Outlook Shifts," No Publication, https://www.markets.com/research/commodity-markets-today-oil-price-steadies-as-global-supply-outlook-shifts, accessed 3-28-2025 //RR

Today, attention centers on oil, where prices have found a moment of calm amid shifting perspectives on global supply. This steadiness emerges not from a single event but from a convergence of factors reshaping how energy flows are perceived. From geopolitical tensions to production adjustments, the oil market’s current state offers a lens into broader commodity trends. This discussion delves into how these shifts influence oil and ripple across other commodities, shaping market behavior. **Oil Price Steadies as** Geopolitical Tensions Ease One driving force behind oil’s steady footing is **a perceived reduction in geopolitical strain.** Recent developments in regions critical to oil production—such as tentative truce talks in conflict zones—have eased fears of immediate supply disruptions. When nations with significant reserves signal de-escalation, markets respond by recalibrating expectations. The possibility of uninterrupted flows from these areas has brought a sense of balance, countering earlier concerns that had kept traders on edge. This shift doesn’t eliminate uncertainty entirely. Ongoing negotiations and fragile agreements mean the situation could pivot quickly. Yet, for now, the prospect of smoother supply lines from these hotspots has contributed to oil’s current stability, influencing how participants view the broader energy landscape. **Oil Price Steadies on Production Adjustments Another layer in this story comes from the actions of leading oil-producing countries**. Nations with substantial output have hinted at tweaking their strategies, either maintaining current levels or preparing to adjust based on global demand cues. **This adaptability reflects a collective effort to stabilize markets, avoiding the sharp swings that disrupt planning for both producers and consumers**. These adjustments aren’t unilateral. **Cooperation among key players—whether through formal alliances or informal understandings—plays a role in preventing oversupply or shortages. As these countries signal their intentions, the market absorbs the news, finding equilibrium**. This coordinated approach contrasts with past periods of volatility, offering a stabilizing anchor for oil and, by extension, related commodities. Oil Price Steadies on Demand Signals **The demand side of the equation also shapes oil’s current steadiness**. Major industrial regions, particularly those driving global manufacturing, are sending mixed but stabilizing signals. While some areas show signs of slowing activity due to trade policy shifts, others maintain steady consumption, buoyed by infrastructure projects and energy needs. This balance keeps oil demand from veering into extremes, supporting the market’s even keel. Seasonal patterns add nuance here. As certain regions approach periods of heightened energy use—think heating or travel seasons—demand holds firm, offsetting softer patches elsewhere. This push-and-pull dynamic ensures that oil’s global supply outlook remains fluid yet manageable, influencing how traders position themselves across commodity markets.

Nuclear power drastically reduces oil dependence, Scientific 24’

Scientific [likely humans], 5-1-24, "Nuclear Essentials," No Publication, https://world-nuclear.org/nuclear-essentials/how-can-nuclear-combat-climate-change, accessed 3-28-2025 //RR

Experts have concluded that in order to achieve the deep decarbonization required to keep the average rise in global temperatures to below 1.5°C, combating climate change would be much harder, without an increased role for nuclear. **Because nuclear power is reliable and can be deployed on a large scale, it can directly replace fossil fuel plant, avoiding the combustion of fossil fuels for electricity generation. The use of nuclear energy today avoids emissions roughly equivalent to removing one-third of all cars from the world’s roads. Nuclear power plants, such as the Diablo Canyon power station in California, provide our societies with reliable and affordable electricity, day in and day out (Photo: Mike Baird) Modern society is becoming more and more dependent on electricity, with demand steadily increasing as transport, domestic heating and industrial processes are increasingly electrified**. Whilst electricity is clean at the point of use, its generation currently produces over 40% of all energy-related carbon emissions. Decarbonising the electricity supply, whilst providing affordable and reliable

electricity to a growing global population, must be central to any climate change strategy. Nuclear energy has shown that it has the potential to be the catalyst for delivering sustainable energy transitions, long before climate change was on the agenda. **France generates over 70% of its electricity from nuclear power – the largest nuclear share of any country globally – and its electricity sector emissions are one-sixth of the European average. In around 15 years, nuclear power went from playing a minor role in the French electricity system to producing the majority of its electricity, showing that nuclear energy can be expanded at the speed required to effectively combat climate change.**

Adams 13 continues

(Rod Adams is the USS Von Steuben former engineer officer, 12/10/13, "Do oil and gas suppliers worry about nuclear energy development?" ANS Nuclear Cafe, pg. online @ http://ansnuclearcafe.org/2013/12/10/do-oil-and-gas-suppliers-worry-about-nuclear/) //RR

Carol Browner, who served as the Environmental Protection Agency administrator in a Democratic administration, insisted that **nuclear energy** has an important role to play in **reducing fossil fuel dependence** and reducing CO2 emissions. Those examples show that the most receptive audiences for the nuclear energy alternative are people who buy a lot of fuel without selling any, and people who are deeply concerned about air pollution and climate change. The former understand that having additional supplies of reliable power will mean more competition to provide more stable and lower prices. The latter group knows that we cannot continue to dump CO2 into the atmosphere at an ever-increasing rate without unexpected consequences. It's time to get more aggressive in nuclear energy marketing. The uranium industry should teach people how heat is fungible in order to excite its potential supporters and capture attention from energy pundits. Nuclear fission heat has already reduced the world's dependence on oil; there is plenty of remaining opportunity. **Nuclear energy pushed oil out of the electricity market** in most of the developed world. Fission has replaced oil combustion in larger ships, but most others still burn oil. Nuclear-generated electricity has replaced oil burned for locomotives, city trolleys, and space heat, but there is room for substantial growth in these markets. Uranium producers should be influential members in the coalitions that are working to electrify transportation systems. Fission heat, especially with higher temperature reactors, can replace oil heat in industrial processes, including those well-proven processes that can turn coal, natural gas, and biomass into liquid fuels. **Fission can also reduce oil use by pushing gas out of the power generation business, thus freeing up more natural gas for other uses**. As the gas promoters love to point out, methane is a flexible and clean burning fuel. It is important to remind their customers that fuel burned in power plants is not available for any other use.

Lack of demand destroys OPEC countries, Manley nd.

David Manley, xx-xx-xxxx, "Stranded Nations? The Climate Policy Implications for Fossil Fuel-Rich Developing Countries," No Publication, https://www.academia.edu/33264362/Stranded_Nations_The_Climate_Policy_Implications_for_Fossil_Fuel_Rich_Developing_Countries?hb-sb-sw=6555023, accessed 3-28-2025 //RR

Developing countries rich in fossil-fuels face a unique challenge posed by climate change. **They seek to extract fossil fuels at a time when the global community must reduce carbon emissions.** Effective global **climate policies** and low carbon technologies will likely **reduce the demand for fossil fuels**, **creating** the risk of **'stranded nations'—where resources under the ground become commercially unattractive to extract** and a substantial share of a **nation's wealth** may permanently **lose its value**. This constitutes a parallel to the stranded assets challenge faced by the private sector. We identify three key challenges faced by fossil-fuel rich developing countries. First, **we show that**

these countries are highly exposed to a decline in fossil fuel demand, with their median ratio of oil and gas reserves to GDP is 3.66, compared with a median for non-FFRCs of 0.58. Second, they are less able to diversify away from this risk than fossil fuel companies or investors - oil companies on average hold only around 13 years of reserves on their balance sheets, whereas FFRDCs hold a median of 45 years of known reserves at current production rates. Third, these countries often find themselves under pressures to implement policies that may expose them to further risk. For example, supporting fossil fuel linked infrastructure and skills that relies on long time horizons for payoffs to the country, subsidising fossil fuel consumption that extends carbon-intensity of production, or by investing state capital in fossil fuel linked assets such as national oil companies. In response, we identify four policy implications arising from this carbon market risk that fossil-fuel rich developing countries should consider. While several of the policy recommendations align with general good practice, we show that the prioritisation, sequencing and in some cases direction of these policies require modification when considering the risks posed by a global shift away from fossil fuels.

And, OPEC will flood the market immediately. Rahemtulla 13’

Rahemtulla, 13 (Karim Rahemtulla, Chief Resource Analyst for Oil & Energy Daily, “Will Saudi Arabia Go Nuclear With An Oil Supply Shock?”, Oil & Energy Daily, 7/30/2013, http://www.oilandenergydaily.com/2013/07/30/saudi-arabia-oil-supply/) //RR

Saudi Arabia is home to the world’s most prolific, consistent daily production of crude oil and the second-largest reserves in the world. The kingdom currently produces 12.5 million barrels per day. It has the capacity to produce another 2.5 million barrels per day. There just isn’t enough demand at current prices. Through its influence over OPEC, it can pretty much set the price for more than one third of the world’s daily oil usage of around 100 million barrels. So even if it doesn’t sell as much oil to the United States – most of our imports come from Canada, Venezuela and Mexico – Saudi Arabia is still a major factor in the price of the oil that we consume. More importantly, the Saudi royal family will do anything to maintain their grip on their kingdom, as well as their own personal power, prestige and wealth. If that means selling oil at a loss, so be it**. The kingdom has NO other source of income and NO other choice. If Saudi Arabia were to feel a genuine threat, it could open the spigot and flood the market**… literally. The other OPEC members would follow suit, as most are in the same boat as Saudi Arabia – with no other source of revenue and leaderships that are dependent on the largesse from oil sales. And if you want to get an idea of what can happen in an industry when supply increases faster than demand, or when prices plunge by more than half, just look at what happened to natural gas prices over the past decade. Wells sit idle and companies cut back production. So while oil may be trading at $106 per barrel today, it could just as easily be trading at half that price a few years from now, and that’s not even counting the increasing downward pressure from alternative energy sources like natural gas. And that would deal a serious blow to the dream of U.S. energy independence.

It escalates - Clarkson 24’

Alexander Clarkson, 9-25-2024, "Falling Oil Prices Could Trigger the Next Geopolitical Shock," World Politics Review, https://www.worldpoliticsreview.com/oil-opec-energy-markets/?one-time-read-code=3282301743205589153546, accessed 3-28-2025 //RR

As the carnage unfolding on battlefields in Ukraine, Gaza and Lebanon understandably dominates global headlines, **a recent decline in energy prices that has the potential to turn the world upside down has barely been noticed outside the industries involved**. But given the role that energy prices often play as an underlying factor shaping global crises, if the fall in oil and natural gas prices over the past few months turns out to be a lasting trend rather than just a temporary blip, the world could be on the cusp of a geopolitical shock whose impact would be as great as any battlefield developments. Over the past year, a range of factors, including interest rate cuts by the U.S. Federal Reserve, signs of distress in China’s economy and concerns about economic growth in Europe, have contributed to the creeping decline of oil prices to $73 per barrel this month, down from eye-watering highs of $120 per barrel after Russia’s invasion of Ukraine in February 2022. But investors and analysts remain unsure about whether this is a long-term trend. In addition to lingering uncertainty over the extent to which OPEC member states, particularly **Saudi Arabia, will react to declining prices**, as well as Russia’s opaque role as it tries to circumvent U.S. and European Union sanctions on its energy sector, several other factors could generate further big shifts in global energy markets. Perhaps the most consequential though often underappreciated recent change to those markets is the transformation of the U.S. in the late 2010s from a net energy importer to a net exporter of oil and the leading exporter of gas. Whether U.S. energy self-sufficiency will give

Washington greater scope to shift the dial when it comes to global energy prices remains unclear. But a scenario in which the U.S. can reshape energy market trends in its own strategic interest could weaken the ability of Saudi Arabia and other OPEC states to do so for theirs. If the current decline of energy prices turns out to be lasting, it would have an immense impact on every global region. But in addition, it would have consequential effects on three key dynamics that are at the heart of so many of today's geopolitical crises as well as global political change more broadly: authoritarian regimes pursuing wars of expansion, fragile states wracked by civil conflict and the technological restructuring driving the green energy transition in industrial democracies. Accelerating declines in the price of oil and gas could throw the strategic calculus behind all three trends out of whack. **The most sudden impact** of a lasting decline in energy prices **would be felt by oil-exporting authoritarian regimes pursuing aggressive and** hugely **expensive efforts to expand their influence** and in some cases their territory, with the clearest example being Russia. President Vladimir Putin's regime has become dependent on energy export revenues to wage its war of conquest against Ukraine while trying to sustain peacetime levels of economic prosperity, at a time when the breakeven price for Russia's oil production is estimated to be above $94 per barrel. Though Russian producers play an important role in other commodity markets, a lasting decline in oil prices would vastly complicate the Russian state's effort to balance the current surge in military production with a simultaneous surge of spending designed to cushion the Russian population from the social impact of endless war. The impact of sustained falls in energy prices would be felt more quickly in oil-producing states, but such a fundamental shift in the global economy would also have profound effects on oil-consuming economies. Just as a decline in oil prices during the 1980s put the Soviet Union under immense economic pressure, **the Putin regime would face stark strategic choices that high oil prices have helped it avoid.** While such a dynamic is unlikely to halt Putin's obsessive efforts to destroy Ukraine, the pressure it would put on Russia's economy could hamper his ability pursue the kind of relentless war of attrition that is currently the foundation of Russian military strategy. Though other social and economic factors are also crucial to Russian state power, trends in energy markets are a variable that any analysis of Russia's potential trajectory needs to take into account. An energy price dynamic that spirals **downward out of OPEC's control** would also have destabilizing effects on other ambitious authoritarian states. In an environment where oil prices fluctuate between $50 and $60 per barrel, **it is difficult to see how Saudi Arabia could still pursue the extravagantly ambitious program of city-building and economic transformation at the heart of Crown Prince Mohammed bin Salman's effort to legitimize his grip on power. Similarly, lower oil prices would make it more difficult for the theocratic regime governing Iran, which is already struggling under the weight of U.S. sanctions on its oil industry, to prevent economic disruption from fueling unrest at home, while also putting greater constraints on its ability to finance proxy militias essential to its bid for regional dominance in the Middle East.** While a fall in oil prices can **put** aggressive authoritarian **regimes under intense pressure**, it would also **destabilize** energy-producing **states** that have been **weakened by corruption and civil conflict**. In **Libya**, a collapse in prices **would exacerbate the battle for control** of oil and gas infrastructure **between rival armed factions** whose power structures depend on energy sector revenues. With less money to go around, pressure to seize oil and gas fields controlled by rival groups in order to sustain the cash flow needed to reward supporters and buy weapons **would in all likelihood lead to a return of all-out civil war on multiple fronts across the country. Though Libya is a unique case in several respects, the strains from low oil prices could have similarly destabilizing effects on states that are already facing economic crises exacerbated by ongoing insurgencies, like Nigeria and South Sudan. For a Nigerian government struggling to implement reforms and fight insurgents, a further fall in revenue could paralyze the state's ability to maintain order in much of the country. With rampant jihadist insurgencies rapidly spreading across West Africa and the Sahel region, the effects of a further deterioration of conditions in Libya and Nigeria would be felt widely across Africa, Europe and the Middle East. The impact of sustained falls in energy prices would be felt more quickly in oil-producing states, but such a fundamental shift in the global economy would also have profound effects on oil-consuming economies.** Though the long-term implications are still unclear, it is difficult to see how a transition toward a carbon-neutral economy would not be affected by oil and gas prices that are significantly lower than policymakers had anticipated. Whether it is the adoption of electric vehicles or expansion of renewable energy sources, calculations based on the cost of such a transition when the price of oil is above $100 per barrel might have to be rethought in a world in which prices are trending toward $50 per barrel. With the price at the pump for the average driver lower than initially anticipated, policymakers will have to find new incentives to encourage the mass adoption of EVs, which underpins so many key strategic goals when it comes to green transition strategies. And broader changes in consumer behavior needed to achieve deeper economic transformation will also require more active state intervention in Europe and North America in a world of much lower energy prices. Though there are many variables in play when it comes to these transformation processes in the U.S., the EU and even China, it is likely that many of the policy initiatives designed to encourage a carbon-free economy would not survive such a huge change in cost pressures in their current form. Even with such a fundamental part of the global economic order as energy prices, however, anyone studying geopolitical change should avoid the "this one big thing explains everything" fallacy, which has led to so many failed policies in the past. When it comes to the fate of authoritarian regimes, struggling societies or the transition to carbon-neutral supply chains, there are many other social, economic and political variables at play that are of equal importance. A collapse in oil and gas prices will not suddenly stop the Putin regime's efforts to conquer Ukraine, ensure a decisive victory for one side or the other in Libya or bring the transition to a carbon-neutral economy entirely to a halt. Yet there are few other structural factors that affect so many different states, trends and crises at the same time as the trajectory of oil and gas prices. With the strategies of every great power vulnerable to trends in energy markets, sudden shifts in oil prices have the potential to turn a seemingly robust regime or policy initiative into a fragile house of cards. And if the current downward trend in energy prices ends up being long-lasting, strongmen who once seemed invincible will flail in desperation as their elaborate plans are torn apart by the laws of supply and demand.

Instability draws in great powers. Lantier 19’

Alex Lantier 19, PHd @ Geneva, Freelance Journalist that reports on Middle Eastern foreign affairs; “Syrian army, Iran threaten counterattack against Turkish invasion of Syria”; World Socialist Web Site; 10-14-2019; https://www.wsws.org/en/articles/2019/10/14/syri-o14.html//AES

After three decades of US-led wars, the outbreak of a third world war, which would be fought with nuclear weapons, is an imminent and concrete danger. At the same time, military tensions between Iran and Saudi Arabia are surging amid mutual attacks on tankers carrying Persian Gulf oil supplies that are critical to the world economy. Last month, the US and Saudi governments blamed a September 14 missile attack on Saudi oil facilities that caused a sharp rise in world oil prices on Iran, without providing any evidence. Then on October 11, two missiles hit the Iranian tanker Sabiti off Saudi Arabia’s Red Sea coast. Ali Shamkhani, the secretary of the Iranian Supreme National Security Council, said yesterday that Iran would retaliate against unnamed targets for the attack on the Sabiti. “A special committee has been set up to investigate the attack on Sabiti... Its report will soon be submitted to the authorities for decision,” Shamkhani told Fars News. “Piracy and mischief on international waterways aimed at making commercial shipping insecure will not go unanswered.” Saudi officials declined to comment on the Sabiti attack, and officials with the US Fifth Fleet in the Gulf sheikdom of Bahrain claimed to have no information on it. But there is widespread speculation in the international media that the attack was carried out by Saudi Arabia or with its support. **The conflict**s erupting between the different capitalist regimes **in the Middle East pose an imminent threat** not only to the population of the region, but to the entire world. Workers can give no support to any of the competing military plans and strategic appetites of these reactionary regimes. **With America, Europe, Russia and China all deeply involved** in the proxy war in Syria, **a large-scale Middle East war could** strangle the world oil supply and **escalate into war between nuclear-armed powers.** The working class is coming face to face with the real possibility of a Third World War. The Kurdish-led SDF militias in Syria, vastly outgunned by Turkish forces and vulnerable to air strikes, warned US officials in talks leaked by CNN that they would appeal for Russia to attack Turkey and protect SDF and Syrian army forces. As Turkey is legally a NATO ally of Washington and the European powers, such an attack could compel the United States and its European allies to either break the 70-year-old NATO alliance or go to war with Russia to protect Turkey.

The draw-in causes extinction.

Clare 23 [Stephen Clare, former research fellow @ the Forethought Foundation, 6-xx-2023, Great power war, 80,000 Hours, https://80000hours.org/problem-profilesgreat-power-conflict/] //RR

A modern great power war could see nuclear weapons, bioweapons, autonomous weapons, and other destructive new technologies deployed on an unprecedented scale. It would probably be the most destructive event in history, shattering our world. It could even threaten us with extinction. We’ve come perilously close to just this kind of catastrophe before.¶ On October 27, 1962 — near the peak of the Cuban Missile Crisis — an American U-2 reconnaissance plane set out on a routine mission to the Arctic to collect data on Soviet nuclear tests. But, while flying near the North Pole, with the stars obscured by the northern lights, the pilot made a navigation error and strayed into Soviet airspace.1¶ Soviet commanders sent fighter jets to intercept the American plane. The jets were picked up by American radar operators and nuclear-armed F-102 fighters took off to protect the U-2.¶ Fortunately, the reconnaissance pilot realised his error with enough time to correct course before the Soviet and American fighters met. But the intrusion enraged Soviet Premier Nikita Khrushchev, who was already on high alert amidst the crisis in Cuba.¶ “What is this, a provocation?” Khrushchev wrote to US President John F. Kennedy. “One of your planes violates our frontier during this anxious time when everything has been put into combat readiness.”¶ If the U-2’s path had strayed further west, or the Soviet fighters had been fast enough to intercept it, this incident could have played out quite differently. Both the United States and the USSR had thousands of nuclear missiles ready to fire. Instead of a nearly-forgotten anecdote, the U-2 incident could have been a trigger for war, like the assassination of Franz Ferdinand.¶ Competition among the world’s most powerful countries shapes our world today. And whether it’s through future incidents like the lost U-2, or something else entirely, it’s plausible that it could escalate and lead to a major, devastating war.¶ Is there anything you can do to help avoid such a terrible outcome? It is, of course, difficult to imagine how any one individual can hope to influence such world-historical events. Even the most powerful world leaders often fail to predict the global consequences of their decisions.¶ But I think the likelihood and severity of great power war makes this among the most pressing problems of our time — and that some solutions could be impactful enough that working on them may be one of the highest-impact things to do with your career.¶ By taking action, I think we can create a future where the threat of great power war is a distant memory rather than an ever-present danger.¶ Summary¶ Economic growth and technological progress have bolstered the arsenals of the world’s most powerful countries. That means the next war between them could be far worse than World War II, the deadliest conflict humanity has yet experienced.¶ Could such a war actually occur? We can’t rule out the possibility. Technical **accidents or diplomatic misunderstandings** could spark a conflict that quickly

escalates. Or international tension could cause leaders to decide they're better off fighting than negotiating. It seems hard to make progress on this problem. It's also less neglected than some of the problems that we think are most pressing. There are certain issues, like making nuclear weapons or military artificial intelligence systems safer, which seem promising — although it may be more impactful to work on reducing risks from AI, bioweapons or nuclear weapons directly. You might also be able to reduce the chances of misunderstandings and miscalculations by developing expertise in one of the most important bilateral relationships (such as that between the United States and China).¶ Finally, by making conflict less likely, reducing competitive pressures on the development of dangerous technology, and improving international cooperation, you might be helping to reduce other risks, like the chance of future pandemics.¶ Our overall view¶ Recommended¶ Working on this issue seems to be among the best ways of improving the long-term future we know of, but all else equal, we think it's less pressing than our highest priority areas (primarily because it seems less neglected and harder to solve).¶ Scale There's a significant chance that a new great power war occurs this century.¶ Although the world's most powerful countries haven't fought directly since World War II, war has been a constant throughout human history. There have been numerous close calls, and several issues could cause diplomatic disputes in the years to come.¶ These considerations, along with forecasts and statistical models, lead me to think there's around a one-in-three chance that a new great power war breaks out in roughly the next 30 years.¶ Few wars cause more than a million casualties and the next great power war would probably be smaller than that. However, there's some chance it could escalate massively. Today the great powers have much larger economies, more powerful weapons, and bigger military budgets than they did in the past. An all-out war could kill far more people than even World War II, the worst war we've yet experienced.¶ Could it become an existentially threatening war — one that could cause human extinction or significantly damage the prospects of the long-term future? It's very difficult to say. But my best current guess is that the chance of an existential catastrophe due to war in the next century is somewhere between 0.05% and 2%.¶ Neglectedness War is a lot less neglected than some of our other top problems. There are thousands of people in governments, think tanks, and universities already working on this problem. But some solutions or approaches remain neglected. One particularly promising approach is to develop expertise at the intersection of international conflict and another of our top problems. Experts who understand both geopolitical dynamics and risks from advanced artificial intelligence, for example, are sorely needed.¶ Solvability Reducing the risk of great power war seems very difficult. But there are specific technical problems that can be solved to make weapons systems safer or less likely to trigger catastrophic outcomes. And in the best case, working on this problem can have a leverage effect, making the development of several dangerous technologies safer by improving international cooperation and making them less likely to be deployed in war.¶ At the end of this profile, I suggest five issues which I'd be particularly excited to see people work on. These are:¶ Developing expertise in the riskiest bilateral relationships¶ Learning how to manage international crises quickly and effectively and ensuring the systems to do so are properly maintained¶ Doing research to improve particularly important foreign policies, like strategies for sanctions and deterrence¶ Improving how nuclear weapons and other weapons of mass destruction are governed at the international level¶ Improving how such weapons are controlled at the national level¶ Why might preventing great power war be an especially pressing problem?¶ A modern great power war — an all-out conflict between the world's most powerful countries — could be the worst thing to ever happen to humanity.¶ Historically, such wars have been exceptionally destructive. Sixty-six million people died in World War II, likely the deadliest catastrophe humanity has experienced so far.¶ Since World War II, the global population and world economy have continued to grow; nuclear weapons have proliferated, and military technology has continued to advance. This means the next world war could be even worse, just as World War II was much deadlier than World War I.¶ It's not guaranteed that such a war will break out. And if it does, it may not escalate to such a terrible extent. But the chance can't be ignored. In fact, there are reasons to think that the odds of World War III breaking out this century are worryingly high.¶ A modern great power war would be devastating for people alive today. But its effects could also persist long into the future. That's because there is a substantial chance that this century proves to be particularly unique. Technologies with the potential to cause a global catastrophe or radically reshape society are likely to be invented. How we choose to develop and deploy them could impact huge numbers of our descendants. And these choices would be affected by the outcomes of a major war.¶ To be more specific, there are three main ways great power conflict could affect the long-term future.¶ High international tension could increase other risks. Great power tensions could make the world more dangerous even if they don't lead to war. During the Cold War, for example, the United States and the USSR never came into direct conflict but invested in bioweapons research and built up nuclear arsenals. This dynamic could return, with tension between great powers fuelling races to develop and build new weapons, raising the risk of a disaster even before shots are fired.¶ War could cause an existential catastrophe. If war does break out, it could escalate dramatically, with modern weapons (nuclear weapons, bioweapons, autonomous weapons, or other future technologies) deployed at unprecedented scale. The resulting destruction could irreparably damage humanity's prospects.¶ War could reshape international institutions and power balances. While such a catastrophic war is possible, it seems extremely unlikely. But even a less deadly war, such as another conflict on the scale of World War II, could have very long-lasting effects. For example, it could reshape international institutions and the global balance of power. In a pivotal century, different institutional arrangements and geopolitical balances could cause humanity to follow different long-term trajectories.¶ The rest of this profile explores exactly how pressing a problem great power conflict is. In summary:¶ Great power relations have become more tense. (More.)¶ Partly as a result, a war is more likely than you might think. It's reasonable to put the probability of such a conflict in the coming decades somewhere between 10% and 50%. (More.)¶ If war breaks out, it would probably be hard to control escalation. The chance that it would become large enough to be an existential risk cannot be dismissed. (More.)¶ It seems hard to make progress on solving such a difficult problem (more) — but there are many things you can try if you want to help (more).¶ International tension has risen and makes other problems worse¶ Imagine we had a thermometer-like device which, instead of measuring temperature, measured the level of international tension.2 This 'tension metre' would max out during periods of all-out global war, like World War II. And it would be relatively low when the great powers3 were peaceful and cooperative. For much of the post-Napoleonic 1800s, for example, the powerful European nations instituted the Concert of Europe and mostly upheld a continental peace. The years following the fall of the USSR also seem like a time of relative calm, when the tension metre would have been quite low.¶ How much more worried would you be about the coming decades if you knew the tension metre would be very high than if you knew it would be low? Probably quite a lot. In the worst case, of course, the great powers could come into direct conflict. But even if it doesn't lead to war, a high level of tension between great powers could accelerate the development of new strategic technologies, make it harder to solve global problems like climate change, and undermine international institutions.¶ During the Cold War, for instance, the United States and USSR avoided coming into direct conflict. But the tension metre would still have been pretty high. This led to some dangerous events:¶ A nuclear arms race. The number of nuclear warheads in the world grew from just 300 in 1951 to over 64,000 in 1986.¶ The development of new bioweapons. Despite signing the Biological Weapons Convention in 1972, the search for military advantages motivated Soviet decision makers to continue investing in bioweapon development for decades. Although never used in combat, biological agents were accidentally released from research facilities, resulting in dozens of deaths and threatening to cause a pandemic.5¶ Nuclear close calls. Military accidents and false alarms happened regularly, and top decision makers were more likely to interpret these events hostilely when tensions were high. On several occasions it seems the decision about whether or not to start a nuclear war came down to individuals acting under stress and with limited time.¶ This means international tension as existential risk factor. It's connected to a number of other problems, which means reducing the level of international tension would lower the total amount of existential risk we face.¶ The level of tension today¶ Recently, international tension seems to have once again been rising. To highlight some of the most salient examples:¶ China-United States relations have deteriorated, leading to harsh diplomatic rhetoric and protectionist trade policies that aim to reduce the countries' economic interdependence.¶ Russia's invasion of Ukraine has killed about a hundred thousand people so far, raised the risk of nuclear war, and sent United States-Russia relations to their lowest point since the Cold War.¶ Chinese and Indian soldiers fought deadly skirmishes along their countries' disputed border in 2020–21.¶ These dynamics raise an important question: how much more dangerous is the world given this higher tension than it would be in a world of low tension?¶ I think the answer is quite a bit more dangerous — for several reasons. First, international tension seems likely to make technological progress more dangerous. There's a good chance that, in the coming decades, humanity will make some major technological breakthroughs. We've discussed, for example, why one might worry about the effects of advanced artificial intelligence systems or biotechnology. The level of tension could strongly affect how these technologies are developed and governed. Tense relations could, for example, cause countries to neglect safety concerns in order to develop technology faster.¶ Second, great power relations will strongly influence how nations do, or do not, cooperate to solve other global collective action problems. For example, in 2022, China withdrew from bilateral negotiations with the United States over climate action in protest of what it perceived as American diplomatic aggression in Taiwan. That same year, efforts to strengthen the Biological Weapons Convention were reportedly hampered by the Russian delegation after their country's invasion of Ukraine raised tensions with the United States and other western countries.¶ And third, if relations deteriorate severely, the great powers could fight a war.¶ How likely is a war?¶ Wars are destructive and risky for all countries involved. Modern weapons, especially nuclear warheads, make starting a great power war today seem like a suicidal undertaking.¶ But factors like the prevalence of war throughout history, the chance that leaders make mistakes, conflicting ideologies, and commitment problems, make me think that conflict could break out anyway.¶ On balance, I think such an event is somewhat unlikely but hardly unthinkable. To quantify this: I put the chance we experience some kind of war between great powers before 2050 at about one-in-three.7¶ War has occurred regularly in the past¶ One reason to think a war is quite likely is that such conflicts have been so common in the past. Over the past 500 years, about two great power wars have occurred per century.8¶ Naively, this would mean that every year there's a 2% chance such a war occurs, implying the chance of experiencing at least one great power war over the next 80 years — roughly until the end of the century — is about 80%.9¶ This is a very simple model. In reality, the risk is not constant over time and independent across years. But it shows that if past trends simply continue, the outcome is likely to be very bad.¶ Has great power war become less likely?¶ One of the most important concerns of this model is that it assumes the risk is constant over time. Some researchers have argued instead that, arguably since the end of World War II, major conflicts have become much less likely due to:¶ Nuclear deterrence. Nuclear weapons are so powerful and destructive that it's just too costly for countries to start wars against each other.10¶ Democratization. Democracies have almost never gone to war against each other, perhaps because democracies are more interconnected and their leaders are under more public pressure to peacefully resolve disputes with each other.11 The proportion of countries that are democratic has increased from under 10% in 1945 to about 50% today.¶ Strong economic growth and global trade. Global economic growth accelerated following World War II and the value of global exports grew by a factor of almost 30 between 1950 and 2014. Since war disrupts economies and international trade, strong growth raises the costs of fighting.12¶ The spread of international institutions. Multilateral bodies like the United Nations General Assembly and Security Council promote diplomatic dialogue and facilitate coordination to punish transgressors.13¶ It is true that we are living through an unusually long period of great power peace. It's been about 80 years since World War II. We just saw that a simple model using the historical frequency of great power wars suggests there was only a 20% chance of going that long without at least one more war breaking out. This is some evidence in favour of the idea that wars have become significantly less common.¶ At the same time, we shouldn't feel too optimistic.¶ The numerous close calls during the Cold War suggest we were somewhat lucky to avoid a major war in that time. And a 20% chance of observing 80 years of peace is not that low.14 Structural changes might have dramatically reduced the likelihood of war. Or perhaps we've just been lucky. It could even be that technological advances have made war less likely to break out, but more deadly when it occurs, leaving the overall effect on the level of risk ambiguous. It just hasn't been long enough to support a decisive view.15¶ So while the recent historical trend is somewhat encouraging, we don't have nearly enough data to be confident that great power war is a thing of the past. To better predict the likelihood of future conflict, we should also consider distinctive features of our modern world.16¶ One might think that a modern great power war would simply be so destructive that no state leader would ever choose to start one. And some researchers do think that the destruction such a war would wreak globally makes it less likely to occur. But it would be hard to find anyone who claims this dynamic has driven the risk to zero.¶ First, a war could be started by accident.¶ Second, sometimes even prudent leaders may struggle to avoid a slide towards war.¶ We could blunder into war¶ An accidental war can occur if one side mistakes some event as an aggressive action by an adversary.¶ This happened several times during the Cold War. The earlier example of the wayward American reconnaissance plane shows how routine military exercises carry some escalation risk. Similarly, throughout history, nervous pilots and captains have caused serious incidents by attacking civilian planes and ships.17 Nuclear weapons allow for massive retaliatory strikes to be launched quickly — potentially too quickly to allow for such situations to be explained and de-escalated.¶ It is perhaps more likely, though, that an accidental war could be triggered by a technological malfunction. Faulty computers and satellites have previously triggered nuclear close calls. As monitoring systems have become more reliable, the rate at which such accidents have occurred has been going down. But it would be overconfident to think that technological malfunctions have become impossible.¶ Future technological changes will likely raise new challenges for nuclear weapon control. There may be pressure to integrate artificial intelligence systems into nuclear command and control to allow for faster data processing and decision making. And AI systems are known to behave unexpectedly when deployed in new environments.18¶ New technologies will also create new accident risks of their own, even if they're not connected to nuclear weapon systems. Although these risks are hard to predict, they seem significant. I'll say more about how such technologies — including AI, nuclear, biological, and autonomous weapons — are likely to increase war risks later.¶ Leaders could choose war¶ All that said, most wars have not started by accident. If another great power war does break out in the coming decades, it is more likely to be an intentional decision made by a national leader.¶ Explaining why someone might make such a costly, destructive, unpredictable, and risky decision has been called "the central puzzle about war".19 In his motivated researchers to search for "rationalist" explanations for war. In his 2022 book Why We Fight, for example, economist Chris Blattman proposes five basic explanations: unchecked interests, intangible incentives, uncertainty, commitment problems, and misperceptions.19¶ This section discusses how great power tensions may escalate to war in the next few decades. It focuses on three potential conflicts in particular: war between the US and China, between the US and Russia, and between China and India. These are discussed because each of these countries are among the world's largest economies and military powers, and seem particularly likely to fight. At the end, I briefly touch on other potential large conflicts.¶ United States-China¶ The most worrying possibility is war between the United States and China. They are easily the world's largest economies. They spend by far the most on their militaries. Their diplomatic relations are tepid and have recently worsened. And their relationship has several of the characteristics that Blattman identifies as causes of war.¶ At the core of the United States-China relationship is a commitment problem.¶ China's economy is growing faster than the United States'. By some metrics, it is already larger.20 If its differential growth continues, the gap will continue to widen between it and the United States. While economic power is not the sole determinant of military power, it is a key factor.21¶ The United States and China may be able to strike a fair deal today. But as China continues to grow faster, that deal may come to seem unbalanced. Historically, such commitment problems seem to have made these kinds of transition periods particularly dangerous.22¶ In practice, the United States and China may find it hard to agree on rules to guide their interactions, such as how to run international institutions or govern areas of the world where their interests overlap.¶ The most obvious issue which could tip the United States-China relationship from tension into war is a conflict over Taiwan. Taiwan's location and technology industries are valuable for both great powers.¶ This issue is further complicated by intangible incentives.¶ For the United States, it is also a conflict over democratic ideals and the United States' reputation for defending its allies.¶ For China, it is also a conflict about territorial integrity and addressing what are seen as past injustices.¶ Still, forecasts suggest that while a conflict is certainly possible, it is far from inevitable. As of 8 June 2023, one aggregated forecast23 gives a 17% chance of a United States-China war breaking out before 2035.24¶ A related aggregated forecast of the chance that at least 100 deaths occur in conflict between China and Taiwan by 2050 gives it, as of 8 June 2023, a much higher 68% chance of occurring.25¶ United States-Russia¶ Russia is the United States' other major geopolitical rival.¶ Unlike China, Russia is not a rival in economic terms: even after adjusting for purchasing power, its economy is only about one-fifth the size of the United States'.¶ However, Russia devotes a substantial fraction of its economy to its military. Crucially, it has the world's largest nuclear arsenal. And Russian leadership has shown a willingness to project power beyond their country's borders.¶ Top countries by estimated military spending, 2021. Source: SIPRI Russia's 2022 invasion of Ukraine demonstrated the dangers of renewed rivalry between Russia and the United States and West. The war has already been hugely destructive: the largest war in Europe since World War II, with hundreds of thousands of casualties already and no end to the conflict in sight. And it could get much worse. Most notably, Russian officials have repeatedly refused to rule out the use of nuclear weapons.¶ Unchecked interests and intangible incentives are again at play here. Vladimir Putin leads a highly-centralised government. He has spoken about how his desire to rebuild Russia's reputation played in his decision to invade Ukraine.¶ Given their ideological differences and history of rivalry, it is reasonable to expect that the United States and Russia will continue to experience dangerous disagreements in the future. As of 8 June 2023, an aggregated forecast gives a 20% chance that the United States and Russia will fight a war involving at least 1,000 battle deaths before 2050.¶ China-India¶ India is already the world's third-largest economy. If national growth rates remain roughly constant, the size of the Indian economy will surpass that of the United States' sometime this century. India also has nuclear weapons and is already the world's third-largest military spender (albeit at a much lower level than China or the United States).¶ One reason to worry that China and India could fight a war is that they already dispute territory along their border. Countries that share a border, especially when it is disputed, are more likely to go to war than countries that do not. By one count, 88% of the wars that occurred between 1816 and 1980 began as wars between neighbours.26¶ In fact, China and India already fought a brief but violent border war in 1962. Deadly skirmishes have continued since, resulting in deaths as recently as 2020.¶ Forecasters agree that a China-India conflict seems relatively (though not absolutely) likely. An aggregated forecast gives a 10% chance of war before 2035.¶ Other dangerous conflicts¶ These three conflicts — United States-China, United States-Russia, and China-India — are not the only possible great power wars that could occur. Other potential conflicts could also pose existential risk, either because they are dangerous arms races or see widespread deployment of dangerous weapons.¶ We should keep in mind India-Pakistan as a particularly likely conflict between nuclear-armed states and China-Russia as a potential, though unlikely, conflict between great powers with a disputed border and history of war. Plus, new great powers may emerge or current great powers may fade in the years to come.¶ While I think we should prioritise the three potential conflicts I've highlighted above, the future is highly uncertain. We should monitor geopolitical changes and be open to changing our priorities in the future.¶ Overall prediction¶ Below is a table listing relevant predictions from the forecasting platform Metaculus, including the number of predictions made, as of 10 March 2023. Note the different timescales and resolution criteria for each question; they may not be intuitively comparable.¶ I have previously independently estimated the likelihood of seeing a World War III–like conflict this century. My calculation first adjusts historical base rates to allow for the possibility that major wars have become somewhat less likely, and uses the adjusted base rate to calculate the probability of seeing a war between now and 2100.¶ This method gives a 45% chance of seeing a major great power war in the next 77 years. If the probability is constant over time then the cumulative probability between now and 2050 would be 22%. This is aligned with the Metaculus predictions above.¶ We can also ask experts what they think. Unfortunately, there are surprisingly few expert predictions about the likelihood of major conflict. One survey was conducted by the Project for the Study of the 21st Century. The numbers were relatively aligned with the Metaculus forecasts, though slightly more pessimistic. However, it seems a mistake to put too much stock in this survey (see footnote).27¶ We now have at least a rough sense of a great power war's probability. But how bad could it get if it occurred?¶ A new great power war could be devastating.¶ At the time, the mechanised slaughter of World War I was a shocking step-change in the potential severity of warfare. But its severity was surpassed just 20 years later by the outbreak of World War II, which killed more than twice as many people.¶ A modern great power war could be even worse.¶ How bad have wars been in the past?¶ The graph below shows how common wars of various sizes are, according to the Correlates of War's Interstate War dataset.28¶ The x-axis here represents war size in terms of the logarithm of the number of battle deaths. The y-axis represents the logarithm of the proportion of wars in the dataset that are at least that large.¶ Using logarithms means that each step to the right in the graph represents a war not one unit larger, but 10 times larger. And each step up represents a war that is not one unit more likely, but 10 times more likely.¶ What the graph shows is that wars have a heavy tail. Most wars remain relatively small. But a few escalate greatly and become much worse than average.¶ Of the 95 wars in the latest version of the database, the median battle death count is 8,000. But the heavy tail means the average is 330,000 battle deaths. And the worst war, World War I, had almost 17 million battle deaths.30¶ The number of battle deaths is only one way to measure the badness of wars. We could also consider the proportion of the population of the countries involved who were killed in battle. By this measure, the worst war since 1816 was not World War II. Instead, it's the Paraguayan War of 1864–70. In that war, 30 soldiers died for every 1,000 citizens of the countries involved. It's even worse if we also consider civilian deaths; while estimates are very uncertain, it's plausible that about half of the men in Paraguay, or around a quarter of the entire population, was killed.31¶ What if instead we compared wars by the proportion of the global population killed? World War II is again the worst conflict since 1816 on this measure, having killed about 3% of the global population. Going further back in time, though, we can find worse wars. Ghengis Khan's conquests likely killed about 9.5% of people in the world at the time.¶ The heavy tail means that some wars will be shockingly large.32 The scale of World War I and World War II took people by surprise, including the leaders who initiated it.¶ It's also hard to know exactly how big wars could get. We haven't seen many really large wars. So while we know there's a heavy tail of potential outcomes, we don't know what that tail looks like.¶ That said, there are a few reasons to think that wars much worse than World War II are possible.¶ We're statistically unlikely to have brushed up against the end of the tail, even if the tail has an upper bound.¶ Other wars have been deadlier on a per-capita basis. So unless wars involving countries with larger populations are systematically less intense, we should expect to see more intense wars involving as many people as World War II.¶ Economic growth and technological progress are continually increasing humanity's war-making capacity. This means that, once a war has started, we're at greater risk of extremely bad outcomes than we were in the past.¶ So how bad could it get? How bad could a modern great power war be? Over time, two related factors have greatly increased humanity's capacity to make war. 33 First, scientific progress has led to the invention of more powerful weapons and improved military efficiency. Second, economic growth has allowed states to build larger armies and arsenals. Since World War II, the world economy has grown by a factor of more than 10 in real terms; the number of nuclear weapons in the world has grown from basically none to more than 9,000, and we've invented drones, missiles, satellites, and advanced planes, ships, and submarines. Ghengis Khan's conquests killed about 10% of the world, but this took place over the course of two decades. Today that proportion may be killed in a matter of hours.

First, **nuclear weapons could be used.** Today there are around 10,000 nuclear warheads globally.34 At the peak of nuclear competition between the United States and the USSR, though, there were 64,000. If arms control agreements break down and competition resurges among two or even three great powers, nuclear arsenals could expand. In fact, China's arsenal is very likely to grow — though by how much remains uncertain. Many of the nuclear weapons in the arsenals of the great powers today are at least 10 times more powerful than the atomic bombs used in World War II.35 Should these weapons be used, th**e consequences would be catastrophic. By any measure, such a war would be by far the most destructive, dangerous event in human history, with the potential to cause billions of deaths. The probability that it would, on its own, lead to humanity's extinction or unrecoverable collapse, is contested. But there seems to be some possibility — whether through a famine caused by nuclear winter, or by reducing humanity's resilience enough that something else, like a catastrophic pandemic, would be far more likely to reach extinction-levels (read more in our problem profile on nuclear war). Nuclear weapons are complemented and amplified by a variety of other modern military technologies, including improved missiles, planes, submarines, and satellites. They are also not the only military technology with the potential to cause a global catastrophe — bioweapons**, too, have the potential to cause massive harm through accidents or unexpected effects. What's more, humanity's war-making capacity seems poised to further increase in the coming years due to technological advances and economic growth. Technological progress could make it cheaper and easier for more states to develop weapons of mass destruction. In some cases, political and economic barriers will remain significant. Nuclear weapons are very expensive to develop and there exists a strong international taboo against their proliferation. In other cases, though, the hurdles to developing extremely powerful weapons may prove lower. Improvements in biotechnology will probably make it cheaper to develop bioweapons. Such weapons may provide the deterrent effect of nuclear weapons at a much lower price. They also seem harder to monitor from abroad, making it more difficult to limit their proliferation. And **they could spark a** global biological catastrophe, like a major — possibly **existentially catastrophic — pandemic.** Artificial intelligence systems are also likely to become cheaper as well as more powerful. It is not hard to imagine important military implications of this technology. For example, AI systems could control large groups of lethal autonomous weapons (though the timeline on which such applications will be developed is unclear). They may increase the pace at which war is waged, enabling rapid escalation outside human control. And AI systems could speed up the development of other dangerous new technologies. Finally, we may have to deal with the invention of other weapons which we can't currently predict. The feasibility and danger of nuclear weapons was unclear to many military strategists and scientists until they were first tested. We could similarly experience the invention of destabilising new weapons in our lifetime. What these technologies have in common is the potential to quickly kill huge numbers of people: A nuclear war could kill tens of millions within hours, and many more in the following days and months. A runaway bioweapon could prove very difficult to stop. Future autonomous systems could act with lightning speed, even taking humans out of the decision-making loop entirely. Faster wars leave less time for humans to intervene, negotiate, and find a resolution that limits the damage. How likely is war to damage the long-run future? When a war begins, leaders often promise a quick, limited conflict. But escalation proves hard to predict ahead of time (perhaps because people are scope-insensitive, or because escalation depends on idiosyncratic decisions). This raises the possibility of enormous wars that threaten all of humanity.

1NC -- Water

Water Quality has been improving. GAO 24

Gao, September 2024, "Water Quality and Protection," No Publication, https://www.gao.gov/water-quality-and-protection, accessed 3-31-2025 //MA

Safe and clean water is necessary for human and environmental health and the nation's economic well-being. **Over the past 50 years, the nation's water quality and drinking water have improved**, but threats to water quality and safety remain. For example, the Environmental Protection Agency (EPA) and the states have identified almost 70,000 water bodies nationwide that do not meet water quality standards. Further, studies show that most people in the U.S. have been exposed to per- and polyfluoralkyl substances (PFAS)—likely from contaminated water, food, or air. Known as forever chemicals, they can persist in the environment and cause adverse health effects. Additionally, emerging contaminants near military bases and other communities has renewed awareness about the risks that lead and other chemical compounds pose to public health. Nation states, cybercriminals, and hacktivists have also attacked the nation's water and wastewater systems, making cybersecurity a top concern. Examples of How Per- and Polyfluoroalkyl Substances (PFAS) Enter the Environment Examples of How Per and Polyfluoroalkyl Substances Enter the Environment The EPA and other federal agencies face a number of challenges in ensuring that the nation has access to safe and clean water. For instance: Contaminants. Under the Safe Drinking Water Act (SDWA), EPA establishes legally enforceable standards that limit the levels of specific contaminants in drinking water. EPA identifies unregulated contaminants, monitors them, and determines whether to regulate them based on things like how dangerous they are to public health, and how often they occur. Public water systems must comply with monitoring, reporting, and other requirements established by EPA and responsible states. But the data that states reported to EPA did not always reflect the frequency of health-based and monitoring violations by community water systems or the status of enforcement actions. Regarding certain PFAS contaminants, public water systems will need to implement a treatment method by 2029. But treating PFAS in drinking water also creates waste that needs to be properly disposed of to avoid future environmental contamination.

However, Nuclear energy is bad for biod

Harvey **Wasserman 16**, American journalist, author, democracy activist, and advocate for renewable energy, strategist and organizer in the anti-nuclear movement in the United States for over 30 years, "How Nuclear Power Causes Global Warming", Progressive, Sept 21 2016, //RR

Supporters of nuclear power like to argue that nukes are the key to combatting climate change. Here's why **they are dead wrong.** Every nuclear generating station spews about two-thirds of the energy it burns inside its reactor core into the environment. **Only one-third is converted into electricity**. **Another tenth of that is lost in transmission.** According to the Union of Concerned Scientists: **Nuclear fission is the most water intensive method** of the principal thermoelectric generation options in terms of the amount of water withdrawn from sources. In 2008, nuclear power plants withdrew eight times as much freshwater as natural gas plants per unit of energy produced, and up to 11 percent more than the average coal plant. Every day, **large reactors like the two at Diablo Canyon, California, individually dump about 1.25 billion gallons of water into the ocean** at temperatures up to **20 degrees Fahrenheit warmer than the natural environment.** Diablo's "once-through cooling system" takes water out of the ocean and dumps it back **superheated, irradiated and laden with toxic chemicals**. Many U.S. reactors use cooling towers which emit huge quantities of steam and water vapor that also directly warm the atmosphere. These emissions are often chemically treated to prevent algae and other growth that could clog the towers. Those chemicals can then be carried downwind, along with radiation from the reactors. In addition, hundreds of thousands of birds die annually by flying into the reactor domes and towers. The Union of Concerned Scientists states: **The temperature increase in the bodies of water can have serious adverse effects on aquatic life**. Warm water holds less oxygen than cold water, thus discharge from once-through cooling systems can create a "temperature squeeze" that elevates the metabolic rate for fish. Additionally, suction pipes that are used to intake water can draw plankton, eggs and larvae into the plant's machinery, while larger organisms can be trapped against the protective screens of the pipes. Blocked intake screens have led to

temporary shut downs and NRC fines at a number of plants. And that's not all. All nuclear reactors emit Carbon 14, a radioactive isotope, invalidating the industry's claim that reactors are "carbon free." And the fuel that reactors burn is carbon-intensive. The mining, milling, and enrichment processes needed to produce the pellets that fill the fuel rods inside the reactor cores all involve major energy expenditures, nearly all of it based on coal, oil, or gas. And of course there's the problem of nuclear waste. After more than a half-century of well-funded attempts, we've seen no solution for the management of atomic power's intensely radioactive waste. There's the "low-level" waste involving enormous quantities of troublesome irradiated liquids and solid trash that must be dealt with outside the standard civilian waste stream. And that handling involves fossil fuels burned in the process of transportation, management, and disposal as well As for the high-level waste, this remains one of humankind's most persistent and dangerous problems. Atomic apologists have claimed that the intensely radioactive spent fuel rods can somehow be usable for additional power generation. But after a half-century of efforts, with billions of dollars spent, all attempts to do that have utterly failed. There are zero successful reactors capable of producing more reactor fuel than they use, or able to derive more energy from the tens of thousands of tons of spent fuel rods they create. Some reactors, like Fukushima, use "mixed-oxide" fuels that have proven to be extremely dirty and expensive. It's possible some of this "MOX" fuel containing plutonium, actually fissioned at Fukushima Unit Three, raising terrifying questions about the dangers of its use. The mushroom cloud that appears on video as Fukushima Unit Three exploded stands as an epic warning against further use of these impossible-to-manage fuels. The MOX facility under construction near Aiken, South Carolina, is now projected to require another ten years to build with another ten possible after that to phase into production. U.S. Secretary of Energy Ernest Moniz said on September 13, 2016, at the Carnegie Endowment for International Peace that the mismanaged project was "impossible" to carry out and that it could cost $30 billion to $50 billion. Even the current pro-nuclear Congress won't fully fund the project and the Department of Energy DOE continues to recommend abandoning it. There are no credible estimates of the global warming damage done by the intensely hot explosions at the four Fukushima reactors, or at Chernobyl, or at any other past and future reactor meltdowns or blowups. Atomic apologists argue that the disposal of high-level reactor wastes should be a relatively simple problem, lacking only the political will to proceed. The industry touts New Mexico's Waste Isolation Pilot Project, or WIPP, which has long been the poster child for military attempts to deal with high-level trash from the nuclear weapons program. Accepting its first shipment of waste in 1999, WIPP was touted as the ultimate high-tech, spare-no-expense model that proved radioactive waste disposal "can be done." But a series of disastrous events in February, 2014, led WIPP to stop accepting wastes—the sole function for which it was designed. Most significant was the explosion of a single barrel of highly radioactive waste materials (it was mistakenly packed with organic rather than clay-based kitty litter). About a dozen WIPP workers were exposed to potentially harmful radiation. The entire facility remains closed. In a phone interview, facility management told me it may again accept some wastes before the end of this year. But at least part of the cavernous underground labyrinth may never be reopened. The Los Angeles Times estimated the cost of this single accident at $2 billion. Overall, the idea that atomic power is "clean" or "carbon free" or "emission free" is a very expensive misconception, especially when compared to renewable energy, efficiency, and conservation. Among conservation, efficiency, solar and wind power technologies, there are no global warming analogs to the heat, carbon, and radioactive waste impacts of nuclear power. No green technology kills anywhere near the number of marine organisms that die through reactor cooling systems. Rooftop solar panels do not lose ten percent of the power they generate to transmission, as happens with virtually all centralized power generators. S. David Freeman, former head of numerous large utilities and author of All Electric America: A Climate Solution and the Hopeful Future, says: "Renewables are cheaper and safer. That argument is winning. Let's stick to it." No terrorist will ever threaten one of our cities by blowing up a solar panel. But the nuclear industry that falsely claims its dying technology doesn't cause global warming does threaten the future of our planet.

Overall, Poor Water quality kills biodiversity. Bagayas 24

Mckenzie Bagayas, a human, 5-21-2024, "How Does Water Pollution Affect Aquatic Biodiversity ," Kraken Sense, https://krakensense.com/blog/water-pollution-aquatic-biodiversity, accessed 3-27-2025 //MA

"Living species variations from sources that include terrestrial, marine, different aquatic ecosystems and also ecological groups to which they belong: including diversity among species and also ecosystems." This is the well-accepted definition of biodiversity that was made by the United Nations Convention on Biological Diversity. Biodiversity could also refer to the variety of life on Earth. Variety of life and living things can come in the form of genetic diversity among species within an ecosystem and diversity of ecological systems. Biodiversity may also include evolutionary, ecological, and cultural processes that sustain life. Biodiversity is not solely about rare, threatened, and endangered species. Instead, biodiversity is about the interconnectedness of all living things. Although we, humans, are just a single species amidst all of the living things present on this Earth, we are the only species whose actions can have a huge impact on biodiversity. With that said, we have the obligation to try our best to practice biodiversity conservation. Biodiversity - Why is it important People value biodiversity differently, some through a utilitarian lens while others value their intrinsic value. Biodiversity in some form or way is capable of providing for our basic needs like food, fuel, shelter, and even medicine. This is where the utilitarian perspective of the value of biodiversity comes in. Being conscious of the utilitarian value of biodiversity leads to the appreciation of ecosystems. With the appreciation and care of ecosystems natural and beneficial processes such as pollination, seed dispersal, climate regulation, water purification, nutrient cycling, and control of agricultural pests are improved. The utilitarian value of biodiversity could also come in the form of possible unknown services and the possibility of discovering new medicines. Moreover, people also value biodiversity for their cultural, spiritual, and religious value. Biodiversity also holds intrinsic value. In

other words, people value biodiversity for its inherent worth regardless of its value to anyone or anything else. The intrinsic value of biodiversity is more of a philosophical concept that can stem from an individual's belief in the right to exist regardless of species. People may also value biodiversity for its relational value. We find value in the intricate relationships we form with nature. These relationships impart a sense of wellbeing, responsibility, and connection. The various ways people value biodiversity are important because this can be leveraged to influence conservation decisions people make every day. How does water pollution affect Biodiversity? **For aquatic environments, pollution poses a serious issue as it can cause variations in the environmental conditions to which aquatic organisms are sensitive. Aquatic organisms respond to drastic changes in their environment by migrating to any other suitable habitat or in extreme cases they just die off.** In less extreme cases only the reproductive capacity **and** metabolism of the aquatic organisms are affected negatively. However, **this can have a negative consequence on their population in the long run.** Every species present in various trophic levels is important for freshwater ecosystems. Zooplankton and macrobenthic organisms modulate the aquatic productivity of aquatic ecosystems by occupying the intermediate level in the food chain. The aforementioned aquatic organisms are also capable of indicating changes in the aquatic environment. Recent studies have demonstrated that some species of zooplankton and macrobenthic organisms can be used as an indicator of deteriorating water quality resulting from eutrophication and or pollution. The intricate relationships between species in a food web are important. Fish numbers may start to dip as a result of food chain disruption and diversity loss or degradation. The relationship between biodiversity decline and food chain disruption was demonstrated when data from two separate studies about the Egyptian Nile waters conducted several years apart were compared side by side. In 1907 the first study reported that there are a total of 85 fish species in the Egyptian Nile waters. However, the second study, which was conducted in 1997, reported that there are a total of 71 fish species. This significant reduction in fish species has been attributed to several pollution sources generated by industrial activities, agricultural sources, and sewage drains. These findings showed evidence that pollution can reduce species diversity and affect the fish population. Studies have also shown that pollution can make rivers more susceptible to drastic changes. In one study, researchers investigated the effects of rising water temperature and low oxygen levels brought about by pollution on the common mayfly species. Mayfly species are considered cool water insects and they are used as bioindicators that help determine ecologically important features of freshwater ecosystems. During warmer seasons, they have trouble thriving in polluted waters due to elevated temperatures and reduced dissolved oxygen; conditions that the mayfly species are not accustomed to. In a controlled laboratory setting, mayfly species such as the green drake and blue-winged olive, or Ephemera danica and Serratella ignita respectively, are capable of tolerating higher temperatures where dissolved oxygen levels are sufficient. Lowered oxygen levels, near depletion, can lower the mayflies' ability to tolerate temperature extremes. These laboratory findings were substantiated by field study data. Analysis of data collected by the Environment Agency and Natural Resources Wales demonstrated that mayflie populations dropped when the freshwater oxygen concentration decreased and temperature increased. **So with all the findings of the studies combined, there is strong evidence that water pollution can reduce dissolved oxygen in freshwater environments and increase temperature. Moreover, reductions in dissolved oxygen compromised the mayflies' ability to survive temperature extremes. Their ability to increase in numbers was also severely restricted even at temperatures below the lethal limits.** Improving dissolved oxygen levels in freshwater environments is one method of improving their resilience against rising temperatures. By reducing the amount of pollution, especially those of agricultural origins, the freshwater environment can absorb oxygen better. This is supported by a review published in Global Change Biology, which mentioned that there is growing evidence that freshwater ecosystems that contain minimal pollution are resilient against changes brought about by climate change. Pollution reduction may also help improve biodiversity in the freshwater ecosystem.

Any biodiversity loss would cause cataclysmic extinction for all species, including humans

University of Exeter 18 (The University of Exeter is a public research university in Exeter, Devon, South West England, United Kingdom, Febuary 29th 2018, "Biodiversity loss raises risk of 'extinction cascades" Science Daily, https://www.sciencedaily.com/releases/2018/02/180219155019.htm#:~:text=New%20research%20shows%20that%20the,domino%20effect%20of%20further%20extinctions.&text=%22And%20because%20species%20are%20interconnected,can%20affect%20others%20as%20well. February 9th 2021)

The researchers, from the University of Exeter, showed there is a higher risk of extinction cascades when other species are not present to fill the "gap" created by the loss of a species. **Even if the loss of one species does not directly cause knock-on extinctions, the study shows that this leads to simpler ecological communities that are at greater risk of "run-away extinction cascades" with the potential loss of many species. With extinction rates at their highest levels ever and numerous species under threat due to human activity, the findings are a further warning about the consequences of eroding biodiversity. "Interactions between species are important for ecosystem (a community of interacting species) stability,"** said Dr Dirk Sanders, of the Centre for Ecology and Conservation at the University of Exeter's Penryn Campus in Cornwall. "And because **species are interconnected through multiple interactions, an impact on one species can affect others as well. "It has been predicted that more complex food webs will be less vulnerable to extinction cascades because there is a greater chance that other species can step in and buffer against the effects of species loss**. "In our experiment, we used communities of plants and insects to test this prediction." The researchers removed one species of wasp and found that it led to secondary extinctions of other, indirectly linked, species at the same level of the food web. This effect was much stronger in simple communities than for the same species within a more complex food web. Dr Sanders added: "**Our results demonstrate that biodiversity loss can increase the vulnerability of ecosystems to secondary extinctions which, when they occur, can then lead to further simplification causing run-away extinction cascades**." The study, supported by France's Sorbonne Université, is published in the journal Proceedings of the National Academy of Sciences. The paper is entitled: "Trophic redundancy reduces vulnerability to extinction cascades." How extinction cascades work The loss of a predator can initiate a cascade, such as in the case of wolves, where their extinction on one mountain can cause a large rise in the number of deer. This larger number of deer then eats more plant material than they would have before. This reduction in vegetation can cause extinctions in any species that also relies on the plants, but are potentially less competitive, such as rabbits or insects.

Independently, mass Biodiversity loss causes nuclear war. Torres 16

TORRES Institute for Ethics and Emerging Technologies 2016 (Phil, affiliate scholar at the Institute for Ethics and Emerging Technologies, “Biodiversity Loss and the Doomsday Clock: An Invisible Disaster Almost No One Is Talking About”, Common Dreams, Feb 10, , [CORNELL DBT] note://// indicates par.breaks)[AR UMW17] //MA

But there’s another global catastrophe that the Bulletin neglected to consider — a catastrophe that will almost certainly have conflict multiplying effects no less than climate change. I’m referring here to biodiversity loss — i.e., the reduction in the total number of species, or in their population sizes, over time. The fact is that in the past few centuries, the loss of biological diversity around the world has accelerated at an incredible pace. Consider the findings of a 2015 paper published in Science Advances. According to this study, we’ve only recently entered the early stages of the sixth mass extinction event in life’s entire 3.5 billion year history. The previous mass extinctions are known as the “Big Five,” and the last one wiped out the dinosaurs some 65 million years ago. Unlike these past tragedies, though, the current mass extinction — called the “Holocene extinction event” — is almost entirely the result of a one species in particular, namely Homo sapiens (which ironically means the “wise man”).//// But biodiversity loss isn’t limited to species extinctions. As the founder of the Long Now Institute, Stewart Brand, in an article for Aeon, one could argue that a more pressing issue is the reduction in population sizes around the globe. For example, the (GBO-3), published in 2010, found that the total abundance of vertebrates — a category that includes mammals, birds, reptiles, sharks, rays, and amphibians — living in the tropics declined by a whopping 59% between 1970 and 2006. In other words, the population size of creatures with a spine more than halved in only 36 years. The study also found that farmland birds in Europe have declined by 50% since 1980, birds in North America have declined by 40% between 1968 and 2003, and nearly 25% of all plant species are currently “threatened with extinction.” The latter statistic is especially worth noting because many people suffer from what’s called “,” according to which we fail “to recognize the importance of plants in the biosphere and in human affairs.” Indeed, plants form the very bottom of the food chains upon which human life ultimately depends.//// Even more disturbing is the claim that amphibians “face the greatest risk” of extinction, with “42% of all amphibian species … declining in population,” as the GBO-3 reports. Consistent with this, from 2013 that focused on North America found that “frogs, toads and salamanders in the United States are disappearing from their habitats … at an alarming and rapid rate,” and are projected to “disappear from half of the habitats they currently occupy in about 20 years.” The decline of amphibian populations is ominous because amphibians are “ecological indicators” that are more sensitive to environmental changes than other organisms. As such they are the “canaries in the coal mine” that reflect the overall health of the ecosystems in which they reside. When they start to disappear, bigger problems are sure to follow.//// Yet comes from

the Living Planet Report — and its results are no less dismal than those of the GBO-3. For example, it finds that the global population of vertebrates between 1970 and 2010 dropped by an unbelievable 52%. **Although the authors refrain from making any predictions based on their data, the reader is welcome to extrapolate this trend into the near future, noting that as ecosystems weaken, the likelihood of further population losses increases.** This study thus concludes that humanity would "need 1.5 Earths to meet the demands we currently make on nature," meaning that we either need to reduce our c ollective consumption and adopt less myopic economic policies or hurry up and start colonizing the solar system.//// Other studies have found that , , and are currently threatened with extinction. There's also talk about the Cavendish banana , and research has confirmed that honey bees, "the most important insect that transfers pollen between flowers and between plants," are dying out around the world at an alarming rate due to what's called "colony collapse disorder" — perhaps a good metaphor for our technologically advanced civilization and its self-destructive tendencies.//// Turning to the world's oceans, one finds few reasons for optimism here as well. Consider the fact that atmospheric carbon dioxide — the byproduct of burning fossil fuels — is not only warming up the oceans, but it's making them . The resulting changes in ocean chemistry are inducing a process known as "coral bleaching," whereby coral loses the algae (called "zooxanthellae") that it needs to survive. Today, . This has direct consequences for humanity "provide us with food, construction materials (limestone) and new medicines," and in fact "more than half of new cancer drug research is focused on marine organisms." Similarly, yet found that ocean acidification is becoming so pronounced that the shells of "tiny marine snails that live along North America's western coast" are literally dissolving in the water, resulting in "pitted textures" that give the shells a "cauliflower" or "sandpaper" appearance.//// Furthermore, human-created pollution that makes its way into the oceans is carving out vast regions in which the amount of dissolved oxygen is too low for marine life to survive. These regions are called "dead zones," and by Robert Diaz and his colleagues found more than 500 around the world. The biggest dead zone discovered so far is located in the Baltic Sea, and it's been estimated to be about 27,000 square miles, or a little less than the size of New Hampshire, Vermont, and Maryland combined. Scientists have even discovered an "island" of trash in the middle of the Pacific called the "Great Pacific Garbage Patch" that could be up to "." Similar "patches" of floating plastic debris can be found in the Atlantic and Indian oceans as well, although these are not quite as impressive. The point is that "Earth's final frontier" — the oceans — are becoming vast watery graveyards for a huge diversity of marine lifeforms, and in fact in Science predicts that there could be virtually no more wild-caught seafood by 2048.//// Everywhere one looks, the biosphere is wilting — and a single bipedal species with large brains and opposable thumbs is almost entirely responsible for this worsening plight. If humanity continues to prune back the Tree of Life with reckless abandon, we could be forced to confront a global disaster of truly unprecedented proportions. Along these lines, published in Nature and authored by over twenty scientists claims that humanity could be teetering on the brink of a catastrophic, irreversible collapse of the global ecosystem. **According to the paper, there could be "tipping points" — also called "critical thresholds" — lurking in the environment that, once crossed, could initiate radical and sudden changes in the biosphere. Thus, an event of this sort could be preceded by little or no warning: everything might look more or less okay, until the ecosystem is suddenly in ruins.//// We must, moving forward, never forget that just as we're minds embodied, so too are we bodies environed, meaning that if the environment implodes under the weight of civilization, then civilization itself is doomed. While the threat of nuclear weapons deserves serious attention from political leaders and academics, as the Bulletin correctly observes, it's even more imperative that we focus on the broader "contextual problems" that could inflate the overall probability of wars and terrorism in the future. Climate change and biodiversity loss are both conflict multipliers of precisely this sort, and each is a contributing factor that's exacerbating the other. If we fail to make these threats a top priority in 2016, the likelihood of nuclear weapons — or some other form of emerging technology, including biotechnology and artificial intelligence — being used in the future will only increase.**//// Perhaps there's still time to avert the sixth mass extinction or a sudden collapse of the global ecosystem. But time is running out — the doomsday clock is ticking.

Cross x clare 23 from c1 for great power war causing extinction.

1NC -- LAWs

Development of AI requires an insane amount of energy, Ammanath 24’

Beena Ammanath, [Board Member, Centre for Trustworthy Technology], 4-25-2024, "How to manage AI's energy demand — today and in the future," https://www.weforum.org/stories/2024/04/how-to-manage-ais-energy-demand-today-tomorrow-and-in-the-future/?utm_source=chatgpt.com, accessed 3-27-2025 //RR

AI and energy demand Remarkably, the computational **power required for sustaining AI's** rise **is doubling** roughly **every 100 days**. To achieve a tenfold improvement in AI model efficiency, the computational **power demand could surge** by up to **10,000 times. The energy required to run AI tasks is already accelerating with an annual growth rate between 26% and 36%. This means by 2028, AI could be using more power than the entire country of Iceland used in 202**1. The AI lifecycle impacts the environment in two key stages: the training phase and the inference phase. In the training phase, models learn and develop by digesting vast amounts of data. Once trained, they step into the inference phase, where they're applied to solve real-world problems. **At present, the environmental footprint is split, with training responsible for about 20% and inference taking up the lion's share at 80**%. As AI models gain traction across diverse sectors, the need for inference and its environmental footprint will escalate. To align the rapid progress of AI with the imperative of environmental sustainability, a meticulously planned strategy is essential. This encompasses immediate and near-term actions while also laying the groundwork for long-term sustainability. The immediate view: reducing AI's energy demand today Research is emerging about the actionable steps we can take today to align AI progress with sustainability. For example, capping power usage during the training and inference phases of AI models presents a promising avenue for reducing AI energy consumption by 12% to 15%, with a small tradeoff on time to finish tasks with GPUs expected to take around 3% longer.

Current Energy is running out - Halper 24’

Evan Halper [a business reporter for The Washington Post, covering the energy transition. His work focuses on the tensions between energy demands and decarbonizing the economy. He came to The Post from the Los Angeles Times, where he spent two decades, most recently covering domestic policy and presidential politics from its Washington bureau], 2024-03-07, "Amid explosive demand, America is running out of power," Washington Post, https://www.washingtonpost.com/business/2024/03/07/ai-data-centers-power/, Date Accessed: 2025-03-21T17:03:46.088Z //RX

Vast swaths of the United States are at risk of running short of power as electricity-hungry data centers and clean-technology factories proliferate around the country, leaving utilities and regulators grasping for credible plans to expand the nation’s creaking power grid. In Georgia, demand for industrial power is surging to record highs, with the **projection of new electricity use for the next decade now 17 times what it was** only **recently**. Arizona Public Service, the largest utility in that state, is also struggling to keep up, projecting it will be out of transmission capacity before the end of the decade absent major upgrades. **Northern Virginia needs the equivalent of several large nuclear power plants to serve all the new data centers planned and under construction.** Texas, where electricity shortages are already routine on hot summer days, faces the same dilemma. Advertisement The soaring demand is touching off a scramble to try to squeeze more juice out of an **aging power grid** while pushing commercial customers to go to extraordinary lengths to lock down energy sources, such as building their own power plants. “When you look at the numbers, it **is** staggering,” said Jason Shaw, chairman of the Georgia Public Service Commission, which regulates electricity. “It makes you scratch your head and wonder how we ended up in this situation. How were the projections that far off? This has created **a challenge** like we have never seen before.” A major factor behind the skyrocketing demand is the **rapid innovation in artificial intelligence, which is driving the construction of large warehouses of computing infrastructure that require exponentially more power than traditional data centers**. AI is also part of a huge scale-up of cloud computing. Tech firms like Amazon, Apple, Google, Meta and Microsoft are scouring the nation for sites for new data centers, and many lesser-known firms are also on the hunt. **The proliferation of crypto-mining, in which currencies like bitcoin are transacted and minted, is also driving data center growth.** It is all putting new pressures on an overtaxed grid — the network of transmission lines and power stations that move electricity around the country. Bottlenecks are mounting, leaving both new generators of energy, particularly clean energy, and large consumers facing growing wait times for hookups. The situation is sparking battles across the nation over who will pay for new power supplies, with regulators worrying that residential ratepayers could be stuck with the bill for costly upgrades. It also threatens to

stifle the transition to cleaner energy, as utility executives lobby to delay the retirement of fossil fuel plants and bring more online. **The power crunch imperils their ability to supply the energy that will be needed to charge the millions of electric cars** and household appliances required to meet state and federal climate goals. The nation's 2,700 data centers sapped more than 4 percent of the country's total electricity in 2022, according to the International Energy Agency. Its projections show that by 2026, they will consume 6 percent. Industry forecasts show the centers eating up a larger share of U.S. electricity in the years that follow, as demand from residential and smaller commercial facilities stays relatively flat thanks to steadily increasing efficiencies in appliances and heating and cooling systems. Skip to end of carousel Power Grab The artificial intelligence industry is driving a nationwide data center building boom. These sprawling warehouses of computing infrastructure are creating explosive demand for power, water and other resources. Power Grab investigates the impacts on America and the risks AI infrastructure creates for the environment and the energy transition. End of carousel Data center operators are clamoring to hook up to regional electricity grids at the same time the Biden administration's industrial policy is luring companies to build factories in the United States at a pace not seen in decades. That includes manufacturers of "clean tech," such as solar panels and electric car batteries, which are being enticed by lucrative federal incentives. Companies announced plans to build or expand more than 155 factories in this country during the first half of the Biden administration, according to the Electric Power Research Institute, a research and development organization. Not since the early 1990s has factory-building accounted for such a large share of U.S. construction spending, according to the group. Utility projections for the amount of power they will need over the next five years have nearly doubled and are expected to grow, according to a review of regulatory filings by the research firm Grid Strategies. Chasing power In the past, companies tried to site their data centers in areas with major internet infrastructure, a large pool of tech talent, and attractive government incentives. But these locations are getting tapped out. Communities that had little connection to the computing industry now find themselves in the middle of a land rush, with data center developers flooding their markets with requests for grid hookups. Officials in Columbus, Ohio; Altoona, Iowa; and Fort Wayne, Ind. are being aggressively courted by data center developers. **But power supply in some of these second-choice markets is already running low**, pushing developers ever farther out, in some cases into cornfields, according to JLL, a commercial real estate firm that serves the tech industry. Grid Strategies warns in its report that "there are real risks some regions may miss out on economic development opportunities because the grid can't keep up." "Across the board, we are seeing power companies say, 'We don't know if we can handle this; we have to audit our system; we've never dealt with this kind of influx before,'" said Andy Cvengros, managing director of data center markets at JLL. "Everyone is now chasing power. They are willing to look everywhere for it." "We saw a quadrupling of land values in some parts of Columbus, and a tripling in areas of Chicago," he said. "It's not about the land. It is about access to power." Some developers, he said, have had to sell the property they bought at inflated prices at a loss, after utilities became overwhelmed by the rush for grid hookups. Rethinking incentives It is all happening at the same time the energy transition is steering large numbers of Americans to rely on the power grid to fuel vehicles, heat pumps, induction stoves and all manner of other household appliances that previously ran on fossil fuels. A huge amount of clean energy is also needed to create the green hydrogen championed by the White House, as developers rush to build plants that can produce the powerful zero-emissions fuel, lured by generous federal subsidies. **Planners are increasingly concerned that the grid won't be green enough or powerful enough to meet these demands.** Already, soaring power consumption is delaying coal plant closures in Kansas, Nebraska, Wisconsin and South Carolina. In Georgia, the state's major power company, Georgia Power, stunned regulators when it revealed recently how wildly off its projections were, pointing to data centers as the main culprit. The demand has Georgia officials rethinking the state's policy of offering incentives to lure **computing operations**, which generate few jobs but can **boost community budgets through the hefty property taxes they pay.** The top leaders of Georgia's House and Senate, both Republicans, are championing a pause in data center incentives. Georgia regulators, meanwhile, are exploring how to protect ratepayers while ensuring there is enough power to meet the needs of the state's most-prized new tenants: clean-technology companies. Factories supplying the electric vehicle and green-energy markets have been rushing to locate in Georgia in large part on promises of cheap, reliable electricity. When the data center industry began looking for new hubs, "Atlanta was like, 'Bring it on,'" said Pat Lynch, who leads the Data Center Solutions team at real estate giant CBRE. "**Now Georgia Power is warning of limitations. ... Utility shortages in the face of these data center demands are happening in almost every market." A similar dynamic is playing out in a very different region: the Pacific Northwest. In Oregon, Portland General Electric recently doubled its forecast for new electricity demand over the next five years, citing data centers and "rapid industrial growth" as the driver**s. That power crunch threw a wrench into the plans of Michael Halaburda and Arman Khalili, longtime data center developers whose latest project involves converting a mothballed tile factory in the Portland area. The two were under the impression only a couple of months ago that they would have no problem getting the electricity they needed to run the place. Then the power company alerted them that it would need to do a "line and load study" to assess whether it could supply the facility with 60 megawatts of electricity — roughly the amount needed to power 45,000 homes.

NPPs solves the energy shortage, Kramer 24'

Anna Kramer, 8-27-2024, "Nuclear Power Could Solve a U.S. Energy Crisis, If States Can Figure Out How to Pay for It," NOTUS, https://www.notus.org/policy/nuclear-power-energy-crisis-cost, accessed 3-27-2025 //RR

There's an obvious solution to the compounding energy problems in the United States, but even overwhelming bipartisan excitement can't overcome one critical obstacle: States say it's just too expensive. Nuclear power is a source of nearly unlimited, carbon-free, dependable energy that could significantly alleviate the stress on the United States' electrical grid and any subsequent spikes in electricity prices. This year, Congress passed nuclear reform with near unanimity, with only two senators and 13 House members in opposition. Yet state public utility commissioners are warning that without even more significant federal investment, **new nuclear plants are simply out of reach — or run the risk of seriously increasing consumers' costs**. "I'm urging commissioner colleagues from around the country to use great caution when considering nuclear," Tim Echols, one of Georgia's public service commissioners, said. Echols is an unlikely naysayer; he's a fan of nuclear power who helped ensure that the first new plant in the country in more than 20 years made it over the finish line in Georgia in 2023. Plant Vogtle will bring stable, dependable, nearly unlimited power to the state. **Still, Georgians will have to pay significantly more for electricity because the project went billions of dollars over budget**. "They are all somewhat aware of Vogtle's issues here in Georgia, and I want them to be successful in their efforts," Echols said. Echols and fellow state commissioner Nick Myers in Arizona have been arguing in private meetings and in editorials for the energy community that the Department of Energy and Congress should embrace the idea of a federal backstop to cover the cost overruns for future new nuclear plants. **Echols wants the government to allocate $50 billion of IRA funding for five reactors instead of passing the prices along in the electricity bills of the communities served by the nuclear plant. "Regulators don't want to pass the costs on to the ratepayers," Myers said**.

Degrading U.S. AI is key— US is working towards LAWs Bartlett 19'

Matt Bartlett, 1-28-2019, "The AI Arms Race In 2019," Medium, https://towardsdatascience.com/the-ai-arms-race-in-2019-fdca0a086a, accessed 10-19-2022//EE6.6.

The Pentagon has committed to a $9 billion spend on American military AI, explicitly citing the need to keep up with Russian and Chinese military technology. While the American budget for AI represents just a fraction of overall defence spending, much like in Russia, **the figure has doubled in recent years. Unique among the global powers, the US has already started deploying autonomous vehicles in turbulent combat areas, in large numbers and with significant roles. Autonomous naval vehicles have begun to patrol the South China Sea — with larger, more powerful machines on their way. Most striking of all, American aerial drones have rained death all over Afghanistan and Pakistan under the Obama administration. It is absolutely clear why the United States have opposed all moves towards a prohibition of autonomous weapons: America wants to win the arms race, not stop it. For its part, China has actually indicated its support in April last year for a ban on battlefield use of autonomous weapons.**

Independently,a Warren '18 writes

Aiden Warren, 9-1-2018, "LETHAL AUTONOMOUS ROBOTICS: RETHINKING THE DEHUMANIZATION OF WARFARE" UCLA Journal of International Law and Foreign Affairs, https://www.jstor.org/stable/pdf/45302406.pdf?refreqid=excelsior%3A9e5f8f9749bdfe02d9ef24a5c1f3f763&ab_segments=&origin=, accessed 10-19-2022//EE6.6.

For example, Garcia asserts that the large influence wielded by the US makes it "the only country in a strong enough position to take the lead to stop a technology that will mean the loss of humanity in decisions of war and peace. . . . The US is at a privileged pivotal moment where it has the edge in the

development of a technology that is not yet operational. Practically, rapid proliferation will put the US at risk just as much as everyone else."

The impact is terrorism

Ware ‘19 writes that

Jacob Ware, 9-24-2019, "Terrorist Groups, Artificial Intelligence, and Killer Drones," War on the Rocks, https://warontherocks.com/2019/09/terrorist-groups-artificial-intelligence-and-killer-drones/, accessed: 3-29-2023 //ZD

The current framework controlling high-tech weapons proliferation — the Wassenaar Arrangement and Missile Technology Control Regime — is voluntary, and is constantly tested by great-power weapons development. Given interest in developing AI-guided weapons, this seems unlikely to change. Ultimately, as AI expert Toby Walsh notes, the world's weapons companies can, and will, "make a killing (pun very much intended) selling autonomous weapons to all sides of every conflict." Finally, **autonomous weapons technology is likely to leak. Innovation** in the AI field **is led by the private sector,** not the military, because of the myriad commercial applications of the technology. **This will make it more difficult to contain** the technology, **and prevent it from proliferating to nonstate actors**. Perhaps the starkest warning has been issued by Paul Scharre, a former U.S. defense official: "**We are entering a world where the technology to build lethal autonomous weapons is available not only to nation-states but to individuals as well.** That world is not in the distant future. It's already here." Counter-Terrorism Options Drones and AI provide a particularly daunting counter-terrorism challenge, simply because effective counter-drone or anti-AI expertise does not yet exist. That said, as Daveed Gartenstein-Ross has noted, "in recent years, we have seen multiple failures in imagination as analysts tried to discern what terrorists will do with emerging technologies.

LAWs increase the incentive to attack— Ware continues that

Jacob Ware, 9-24-2019, "Terrorist Groups, Artificial Intelligence, and Killer Drones," War on the Rocks, https://warontherocks.com/2019/09/terrorist-groups-artificial-intelligence-and-killer-drones/, accessed: 3-29-2023 //ZD

Firstly, killer robots are likely to be extremely cheap, while still maintaining lethality. Experts agree that **lethal autonomous weapons, once fully developed, will provide a cost-effective alternative to terrorist groups looking to maximize damage**, with Tegmark arguing that "**small AI-powered killer drones are likely to cost little more than a smartphone.**" Additionally, killer robots will minimize the human investment required for terrorist attacks, with scholars arguing that "greater degrees of autonomy enable a greater amount of damage to be done by a single person." Artificial intelligence could make terrorist activity cheaper financially and in terms of human capital, lowering the organizational costs required to commit attacks. Secondly, **using autonomous weapons will reduce the trace left by terrorists.** A large number of munitions could be launched — and a large amount of damage done — by a small number of people operating at considerable distance from the target, reducing the signature left behind. In Tegmark's words, for "a terrorist wanting to assassinate a politician … all they need to do is upload their target's photo and address into the killer robot: it can then fly to the destination, identify and eliminate the person, and self-destruct to ensure nobody knows who was responsible." With autonomous weapons tech=nology, **terrorist groups will be able to launch increasingly complex attacks, and**, when they want to, **escape without detection.** Finally, **killer robots** could reduce, if not **eliminate, the** physical costs and **dangers of terrorism,** rendering the operative "essentially invulnerable." **Raising the possibility of "fly and forget" missions, lethal autonomous weapons might simply be deployed toward a target, and engage that target without further human intervention**. As P. W. Singer noted in 2012, **"one [will] not have to be suicidal to carry out attacks that previously might have**

required one to be so. This allows new players into the game, making al-Qaeda 2.0 and the next-generation version of the Unabomber or Timothy McVeigh far more lethal." Additionally, lethal autonomous weapons could potentially reduce human aversion to killing, **making terrorism even more palatable as a tactic for political groups.** According to the aforementioned February 2018 report, "AI systems **can allow the actors who would otherwise be performing the tasks to retain their anonymity and experience a greater degree of psychological distance from the people they impact**"; this would not only improve a terrorist's chances of escape, as mentioned, but reduce or even eliminate the moral or psychological barriers to murder.

That causes extinction. Klare 23'

Michael T. Klare, 2023, "AI vs. AI: Flash Wars and Human Extinction," Peace & Planet News, https://peaceandplanetnews.org/ai-vs-ai-flash-wars-and-human-extinction/amp/, accessed 4-4-2025 //MA

Despite all the secrecy surrounding these projects, you can think of ABMS, JADC2, Convergence, and Overmatch as building blocks for a future Skynet-like mega-network of super-computers designed to command all U.S. forces, including its nuclear ones, in armed combat. The more the Pentagon moves in that direction, the closer we'll come to a time **when AI possesses life-or-death power over all American soldiers along with opposing forces and any civilians caught in the crossfire. Such a prospect should be ample cause for concern. To start with, consider the risk of errors and miscalculations by the algorithms at the heart of such systems. As top computer scientists have warned us, those algorithms are capable of remarkably inexplicable mistakes and, to use the AI term of the moment, "hallucinations**" — that is, seemingly reasonable results that are entirely illusionary. Under the circumstances, it's not hard to imagine such computers "hallucinating" an imminent enemy attack and launching a war that might otherwise have been avoided. And that's not the worst of the dangers to consider. After all, there's the obvious likelihood that America's adversaries will similarly equip their forces with robot generals. In other words, future wars are likely to be fought by one set of AI systems against another, both linked to nuclear weaponry, with entirely unpredictable — but potentially catastrophic — results. Not much is known (from public sources at least) about Russian and Chinese efforts to automate their military command-and-control systems, but both countries are thought to be developing networks comparable to the Pentagon's JADC2. As early as 2014, in fact, Russia inaugurated a National Defense Control Center (NDCC) in Moscow, a centralized command post for assessing global threats and initiating whatever military action is deemed necessary, whether of a non-nuclear or nuclear nature. Like JADC2, the NDCC is designed to collect information on enemy moves from multiple sources and provide senior officers with guidance on possible responses. China is said to be pursuing an even more elaborate, if similar, enterprise under the rubric of "Multi-Domain Precision Warfare" (MDPW). According to the Pentagon's 2022 report on Chinese military developments, its military, the People's Liberation Army, is being trained and equipped to use AI-enabled sensors and computer networks to "rapidly identify key vulnerabilities in the U.S. operational system and then combine joint forces across domains to launch precision strikes against those vulnerabilities." Picture, then, a future war between the U.S. and Russia or China (or both) in which the JADC2 commands all U.S. forces, while Russia's NDCC and China's MDPW command those countries' forces. Consider, as well, that all three systems are likely to experience errors and hallucinations. How safe will humans be when robot generals decide that it's time to "win" the war by nuking their enemies? If this strikes you as an outlandish scenario, think again, at least according to the leadership of the National Security Commission on Artificial Intelligence, a congressionally mandated enterprise that was chaired by Eric Schmidt, former head of Google, and Robert Work, former deputy secretary of defense. "While the Commission believes that properly designed, tested, and utilized AI-enabled and autonomous weapon systems will bring substantial military and even humanitarian benefit**, the unchecked global use of such systems potentially risks unintended conflict escalation and crisis instability,**" it affirmed in its Final Report. Such dangers could arise, it stated, "because of challenging and untested complexities of interaction between AI-enabled and autonomous weapon systems on the battlefield" — when, that is, AI fights AI. Though this may seem an extreme scenario, it's entirely possible that opposing **AI systems could trigger a catastrophic "flash war"** — the military equivalent of a "flash crash" on Wall Street, when huge transactions by super-sophisticated trading algorithms spark panic selling before human operators can restore order. In the infamous "Flash Crash" of May 6, 2010, computer-driven trading precipitated a 10% fall in the stock market's value. According to Paul Scharre of the Center for a New American Security, who first studied the phenomenon, "the military equivalent of such crises" on Wall Street would arise when the automated command systems of opposing forces "become trapped in a cascade of escalating engagements." In such a situation, he noted, "autonomous weapons could lead to accidental death and destruction at catastrophic scales in an instant." At present, there are virtuall**y no measures in place to prevent a future catastrophe of this sort or even talks among the major powers to devise such measures.** Yet, as the National Security Commission on Artificial Intelligence

noted, such crisis-control measures are urgently needed to integrate “automated escalation tripwires” into such systems “that would prevent the automated escalation of conflict.” Otherwise, some catastrophic version of World War III seems all too possible. Given the dangerous immaturity of such technology and the reluctance of Beijing, Moscow, and Washington to impose any restraints on the weaponization of AI, the day when machines could choose to annihilate us might arrive far sooner than we imagine **and the extinction of humanity** could be the collateral damage of such a future war.

1NC -- Saudi Prolif

Despite the Saudis efforts, they lack access to nuclear energy, Mecklin 23’

John Mecklin, 8-28-2023, "There should be no Saudi uranium enrichment," Bulletin of the Atomic Scientists, https://thebulletin.org/2023/08/there-should-be-no-saudi-uranium-enrichment/, accessed 4-1-2025 //RR

The crown prince hasn’t been shy about revealing how he may use a civilian nuclear power project. In a 2018 CBS News interview he said, “Saudi Arabia does not want to acquire any nuclear bomb, but without a doubt if Iran developed a nuclear bomb, we will follow suit as soon as possible.” Will he wait for that development? He made no mention of working through the international system to prevent an Iranian bomb. He **wants a nuclear power program on a hair trigger, ready to convert quickly to a nuclear weapon program**. **That isn’t of course the polite version of the crown prince’s plan. He says he wants to use domestic uranium, of which the Saudis claimed to have large deposits, to fuel civilian nuclear power reactors.** He wants to produce fuel domestically, ergo he **need**s **to acquire enrichment technology**. But **despite Saudi claims, there are no significant uranium deposits in the country**. **Recent reports reveal that the teams of geologists sent to search for it have turned up empty-handed. That hasn’t, however, caused the crown prince to lose interest in enrichment, which is itself a revealing fact about his intentions—and his reliance on American cupidity. To cope with what the Saudis regard as excessive suspicion of others, they have suggested they are open to accepting some modest additional oversight arrangements, which they cynically expect Congress to accept after members engage in some ritual handwringing.** RELATED: What a second Trump administration may mean for the Saudi nuclear program You would think the Saudi insistence on inclusion of enrichment, no matter how restricted, would be a non-starter for a US-Saudi “123” agreement for nuclear cooperation. (Compliance with Section 123 of the Atomic Energy Act is essential for any significant US-Saudi nuclear trade.) But such common sense is a thin reed to lean on when it comes to Washington nuclear politics. Powerful lobbies have been pushing for years for sale of power reactors in the Middle East and for generous subsidies to allow this to happen. The departments of Energy and State will be supporting this, too, claiming that international “safeguards” would be effective in preventing misuse of civilian nuclear facilities. The official line on nuclear energy is still Atoms for Peace, as it has been since President Eisenhower’s 1953 speech. Recall that George W. Bush said even Iranian power reactors, by themselves, were perfectly legitimate. The problem is that hardly anyone in Congress has any real understanding of nuclear technology. The members are swept off their feet by promises of safe, non-carbon producing energy sources, especially when nuclear proponents use adjectives like “small” and “modular” and “advanced.” Congressional discussions on international aspects seldom get beyond “restoring America’s competitive advantage in nuclear energy.”

Aff causes nuclearization – the US would actively sell SMRs to nuclear-seeking states.

Green, '19 – Jim Green is an anti-nuclear campaigner with Friends of the Earth Australia. Green is a regular media commentator on nuclear issues. He has an honours degree in public health from the University of Wollongong and was awarded a PhD in science and technology studies for his analysis of the Lucas Heights research reactor debates. (Jim Green; "Small modular reactors and nuclear weapons proliferation"; Wise International; https://wiseinternational.org/nuclear-monitor/872-873/small-modular-reactors-and-nuclear-weapons-proliferation; 07-03-2019, Accessed 10-22-2021)//ILake-NoC

Small power reactors have been used to produce fissile material for weapons. Examples include: Magnox reactors in the UK which were used to generate power and to produce plutonium for weapons.11 North Korea has tested weapons using plutonium produced in its 'Experimental Power Reactor' – a Magnox clone.12 India **refuses to place numerous power reactors** (including some of its small PHWR reactors) **under safeguards13** and

presumably uses (or plans to use) them for weapons production. Based on historical experience, there's **every reason to be concerned about** the weapons **proliferation risks associated with a proliferation of SMRs**. It can be anticipated that **countries with an interest in developing weapons – or a latent weapons capability – will be more interested in acquiring SMRs** than countries with no such interest ("nations that lack a need for weapons latency often decide not to build nuclear power plants", Shellenberger states1). Saudi Arabia's interest in acquiring a South Korean-designed SMART SMR may be a topical case study, and South Korea may have found a model to unlock the potential of SMRs: collaboration with a repressive Middle Eastern state that has a **clear interest in developing a nuclear weapons capability**, with extensive technology transfer thrown in.15 A subsidiary of Holtec International has actively sought a military role, inviting the **National Nuclear Security Administration to consider** the feasibility of **using** a proposed **SMR** to produce tritium, used **to boost the explosive yield of the US nuclear weapons** arsenal.16 **NuScale** Power, on the other hand, claims to be taking the high moral ground. NuScale's chief commercial officer said in 2013 that the company is not in business to sell reactors to politically unstable countries.17 Yet in early 2019, NuScale participated in a White House meeting which **discussed**, among other issues, the possibility of **selling nuclear power technology to Saudi Arabia – a known nuclear weapons wannabe in a volatile region.18**

The intrinsic features of SMR enhance the risk of proliferation – AND investment provides cover for reckless nuclear weapons production.

Green, '19 – Jim Green is an anti-nuclear campaigner with Friends of the Earth Australia.[1] Green is a regular media commentator on nuclear issues. He has an honours degree in public health from the University of Wollongong and was awarded a PhD in science and technology studies for his analysis of the Lucas Heights research reactor debates. (Jim Green; "Small modular reactors and nuclear weapons proliferation"; No Publication; https://wiseinternational.org/nuclear-monitor/872-873/small-modular-reactors-and-nuclear-weapons-proliferation; 07-03-2019, Accessed 10-22-2021)//ILake-NoC *partially condensed for readability

By far the most important point to make is that **any configuration of any SMR design will pose proliferation risks**. As the UK Royal Society notes: "**There is no proliferation proof nuclear fuel cycle. The dual use risk of nuclear materials and technology and in civil and military applications cannot be eliminated."**28 Ramana and Mian state in a 2014 article:29 "Proliferation risk … depends on both technical and non-technical factors. While the non-technical factors are largely not dependent on choice of reactor type, **SMRs and their intrinsic features do affect the technical component of proliferation risk. In the case of both iPWRs [integral Pressurized Water Reactors] and fast reactors, the proliferation risk is enhanced relative to current generation light water reactors primarily because greater quantities of plutonium are produced per unit of electricity** generated. In the case of HTRs [high temperature gas-cooled reactors], proliferation risk is increased because of the use of fuel with higher levels of uranium enrichment, but is diminished because the spent fuel is in a form that is difficult to reprocess." Glaser, Hopkins and Ramana compare the proliferation risks of standard light-water reactors, proposed integral pressurized water **SMRs** (iPWRs) and proposed SMRs with long-lived cores (LLCs) that would not require refueling for two or more decades (typically fast-spectrum designs cooled by helium, sodium, or other liquid metals such as lead and lead-bismuth eutectics).30 The authors state:30 "iPWRs a**re likely to have higher requirements for uranium ore and enrichment services compared to gigawatt-scale reactors. This is because of the lower burnup of fuel in iPWRs, which is difficult to avoid because of smaller core size and all-in-all-out core management. These characteristics also translate into an increased proliferation risk unless they are offset by technical innovations in reactor and safeguards design and institutional innovations in the nuclear fuel cycle. "Uranium and uranium enrichment requirements are reduced for fast-spectrum SMRs with LLCs, but in this case strong incentives for spent-fuel reprocessing are likely to result from the high fissile**

content of the spent fuel. This same characteristic also increases the probability of proliferation success in a diversion scenario …" A report by the UK Parliamentary Office of Science & Technology offers these generalizations:31 "There is uncertainty over the extent to which widespread SMR use might increase or decrease non-proliferation risk. Some SMRs require less frequent refuelling than conventional nuclear, reducing high risk periods. However, more integrated designs may be more challenging to inspect, and some designs use more highly enriched uranium than conventional nuclear. Both of these aspects could increase proliferation risk." Uranium enrichment Ramana and Mian note that attempts to reduce one proliferation risk can worsen another:29 "Proliferation resistance is another characteristic that imposes sometimes contradictory requirements. One way to lower the risk of diversion of fuel from nuclear reactors is to minimize the frequency of refueling because these are the periods when the fuel is out of the reactor and most vulnerable to diversion, and so many SMR designers seek longer periods between refueling. However, in order for the reactor to maintain reactivity for the longer period between refuelings, it would require starting with fresh fuel with higher uranium enrichment or mixing in plutonium. "Some designs even call for going to an enrichment level beyond 20 percent uranium-235, the threshold used by the International Atomic Energy for classifying material as being of "direct use" for making a weapon. All else being equal, the use of fuel with higher levels of uranium enrichment or plutonium would be a greater proliferation risk, and is the reason why so much international attention has been given to highly enriched uranium fueled research reactors and converting them to low enriched uranium fuel or shutting them down. "Moreover, **an SMR design relying on highly enriched uranium fuel creates new proliferation risks – the need for production of fresh highly enriched uranium and the possibility of diversion at the enrichment plant and during transport. Any reduction of proliferation risk at the reactor site by reducing refueling frequency, it turns out, may be accompanied by an increase in the proliferation risk elsewhere." In January 2019, the US government allocated US$115 million to kick-start a domestic uranium enrichment project in Piketown, Ohio.32 The HALEU Demonstration Program will aim to produce 19.75%-enriched 'high assay low enriched uranium' (HALEU) using US-designed and operated centrifuge technology.33 The project is being sold as a step towards domestic production of enriched uranium for 'advanced reactors' (including SMRs) but there is also a military agenda.** Republican Senator Rob Portman said: "Getting Piketon back to its full potential benefits the skilled workforce here, the surrounding local economy, and strengthens national energy and defense security."32 The Department of Energy said that Centrus subsidiary American Centrifuge Operating was the only firm that qualified for the project, noting that the company is US-owned and controlled, a requirement for enrichment contracts to supply the military.**32 Nationalistic military hawks have been lobbying furiously (and evidently successfully) to re-establish domestic uranium enrichment in the US to accommodate the Navy's long-term 'need' for additional highly enriched uranium to fuel its reactors for long intervals between refueling, and the 'need' for a domestic source of low enriched uranium to fuel reactors used to produce tritium for weapons.34 It might be the case that very few if any SMRs are ever built in the US, yet the promise of an SMR industry is already providing cover for military projects.**

Civil nuclear energy production is covertly used for nuclear weapons.

Mark **Diesendorf, '16** – (Mark Diesendorf; "Renewable energy versus nuclear: dispelling the myths"; Energy Post; https://energypost.eu/renewable-energy-versus-nuclear-dispelling-myths/; 5-31-2016, Accessed 11-2-2021)//ILake-NoC

Myth 4: Nuclear weapons proliferation is independent of civil nuclear energy. Variant: Nuclear weapons explosives cannot be made from the type of plutonium produced in conventional nuclear power reactors, or from the thorium fuel cycle, or from the IFR. **Six countries (France, India, North Korea, Pakistan, South Africa and the UK)** have **covertly used civil nuclear energy to assist them to develop nuclear weapons. In addition, at least seven countries (Argentina, Australia, Brazil, Iran, Libya, South Korea and Taiwan) have used civil nuclear energy to commence covertly developing nuclear weapons,** but then terminated their programs (references in Diesendorf 2014). **Thus nuclear energy is facilitating proliferation and therefore is increasing the probability of nuclear war. Even if the probability of nuclear war is small (and this is debatable), the potential impacts are huge. Therefore it is inappropriate to ignore the proliferation risk, which is**

probability multiplied by potential impact. Thorium reactors are under development in India. Thorium is not fissile, so it first has to be bombarded with neutrons to convert it into uranium-233, which is. Like any fissile element, U-233 can be used either to generate heat and hence electricity, or as a nuclear explosive. Nuclear weapons with **U-233 as part of the explosive have been tested by the USA (Teapot MET test), Soviet Union and India**. **Some nuclear proponents claim incorrectly that the hypothetical IFR would be proliferation-proof. The IFR has only ever operated as a single prototype in the USA.** The project was cancelled by Congress in 1994 for reasons including funding, doubts about whether it was needed, and concerns about its potential for proliferation (Kerry 1994). The IFR offers at least two proliferation pathways. **Once it has separated most of the highly radioactive fission products from the less radioactive transuranics by means of an experimental process known as pyroprocessing, it would be easier to extract the plutonium-239 from the transuranics by means of conventional chemical reprocessing and use it to produce nuclear weapons.** An alternative proliferation pathway would be to modify an IFR to enable it to be used as a breeder reactor to produce weapons grade plutonium from uranium-238 – see also Wymer et al. (1992).

Iran would respond immediately to any development of a Saudi nuclear program. Matamis 24’

Joaquin Matamis, 1-31-2024, "Will Iran Get the Bomb in 2024? • Stimson Center," Stimson Center, https://www.stimson.org/2024/will-iran-get-the-bomb-in-2024/, accessed 4-4-2025 //RX //MA Brackets in OG

Together, these three pillars form the core of Iran’s deterrence strategy, and any significant weakening in their effectiveness could alter Tehran’s nuclear calculations. Several developments could persuade Iran to abandon its current nuclear posture and weaponize its nuclear program**. First, a major shift in the regional balance of power could convince the Iranian leadership that crossing the nuclear threshold is necessary. This would include the acquisition of nuclear weapons by Ir24an’s regional adversaries, notably Saudi Arabia.** The former secretary of Iran’s Supreme National Security Council (SNSC) Ali Shamkhani, warned in 2019 that since certain regional countries have started **“suspicious” nuclear programs that pose a threat to the “entire region and the world,” Iran may “undoubtedly be compelled to recalibrate [its] strategies based on the nature and geography of new threats, and address the requirements of [its] armed forces in response to this threat.”**

And, Iran could develop nucs within a week. Peters 24’

Robert Peters, 10-1-2024, "Iran Is Inching Toward a Nuclear Weapons Breakout: What Does This Mean for the United States?," Heritage Foundation, https://www.heritage.org/middle-east/report/iran-inching-toward-nuclear-weapons-breakout-what-does-mean-the-united-states, accessed 4-4-2025 //MA brackets in og

Iran can produce nuclear weapons far more rapidly than expected. In late April 2024, a senior Iranian lawmaker stated that there is only a "one-week gap from the issuance of the order to the first test" of a nuclear bomb.[* In July, U.S. Secretary of State Antony Blinken appeared to corroborate this statement in part when he announced that "**instead of being at least a year away from having the breakout capacity of producing fissile material for a nuclear weapon, [Iran] is now probably one or two weeks away.**" 2. An August 2024 International Atomic Energy Agency (IAEA) report all but confirms these statements. As of August 17**, Iran had 363.1 pounds of uranium enriched up to 60 percent-an increase** of 49.8 pounds since the U.N. agency's May 2024 report. 3) Uranium that is "enriched up to 60% purity

is just a short, technical step away from weapons-grade levels of 90%."141 Higher levels of enriched uranium have already been detected by IAEA inspectors. In February 2023, it was reported that "[i]nspectors from the [IAEA had] found uranium particles enriched up to 83.7% in Iran's underground Fordow nuclear site." 5) **This finding confirms that Iran is closer than ever to reaching the 90 percent that it needs to produce a nuclear weapon.**

Saudi Iran war draws in great powers. Lantier 19'

Alex Lantier 19, PHd @ Geneva, Freelance Journalist that reports on Middle Eastern foreign affairs; "Syrian army, Iran threaten counterattack against Turkish invasion of Syria"; World Socialist Web Site; 10-14-2019; https://www.wsws.org/en/articles/2019/10/14/syri-o14.html//AES

After three decades of US-led wars, the outbreak of a third world war, which would be fought with nuclear weapons, is an imminent and concrete danger. At the same time, **military tensions between Iran and Saudi Arabia** are surging amid mutual attacks on tankers carrying Persian Gulf oil supplies that are critical to the world economy. Last month, the US and Saudi governments blamed a September 14 missile attack on Saudi oil facilities that caused a sharp rise in world oil prices on Iran, without providing any evidence. Then on October 11, two missiles hit the Iranian tanker Sabiti off Saudi Arabia's Red Sea coast. Ali Shamkhani, the secretary of the Iranian Supreme National Security Council, said yesterday that Iran would retaliate against unnamed targets for the attack on the Sabiti. "A special committee has been set up to investigate the attack on Sabiti... Its report will soon be submitted to the authorities for decision," Shamkhani told Fars News. "Piracy and mischief on international waterways aimed at making commercial shipping insecure will not go unanswered." Saudi officials declined to comment on the Sabiti attack, and officials with the US Fifth Fleet in the Gulf sheikdom of Bahrain claimed to have no information on it. But there is widespread speculation in the international media that the attack was carried out by Saudi Arabia or with its support. **The conflicts** erupting between the different capitalist regimes **in the Middle East pose an imminent threat** not only to the population of the region, but to the entire world. Workers can give no support to any of the competing military plans and strategic appetites of these reactionary regimes. **With America, Europe, Russia and China all deeply involved** in the proxy war in Syria, **a large-scale Middle East war could** strangle the world oil supply and **escalate into war between nuclear-armed powers.** The working class is coming face to face with the real possibility of a Third World War. The Kurdish-led SDF militias in Syria, vastly outgunned by Turkish forces and vulnerable to air strikes, warned US officials in talks leaked by CNN that they would appeal for Russia to attack Turkey and protect SDF and Syrian army forces. As Turkey is legally a NATO ally of Washington and the European powers, such an attack could compel the United States and its European allies to either break the 70-year-old NATO alliance or go to war with Russia to protect Turkey.

Cross x clare 23 for great power war causing extinction

2NC

Counterinterp -- Disclosure (0:20)

A. **Counterinterp: Teams that open-source disclose each round previously broken arguments and arguments used in round, including with all tags, underlining, and highlights read do not have to put author quals**
B. **We meet: we disclosed**
C. **Standards & Voters:**
    a. **Education: we solve all their link because teams get to scrutinise author qualifications for the entire time outside of the round—on net better because that leads to in depth debates on whose evidence is better. Also o/w because teams not in the round can scrutinise the evidence**
    b. **Fairness: Teams are no longer able to write biased, self serving author quals because everyone relies on the ones publicly available online**

Crossapply DTD

1. **On the framing level.**
    a. Extinction is first -- 100% of humans dying is infinitely worse 99% death is infinitely worse because
    b. All countable infinities are equal, humans keep existing for functionally infinite amounts of time, it doesn't matter if we start earlier -- maths prove

Quanta **Magazine**, 20**17**-09-12, "Mathematicians Measure Infinities and Find They're Equal," https://www.quantamagazine.org/mathematicians-measure-infinities-find-theyre-equal-20170912/, Date Accessed: 2025-04-05T15:33:51.206Z //RX

In a breakthrough that disproves decades of conventional wisdom, two mathematicians have shown that two different variants of **infinity are** actually **the same size**. The advance touches on one of the most famous and intractable problems in mathematics: whether there exist infinities between the infinite size of the natural numbers and the larger infinite size of the real numbers.

The problem was first identified over a century ago. At the time, mathematicians knew that "the real numbers are bigger than the natural numbers, but not how much bigger. Is it the next biggest size, or is there a size in between?" said Maryanthe Malliaris of the University of Chicago, co-author of the new work along with Saharon Shelah of the Hebrew University of Jerusalem and Rutgers University.

In their new work, Malliaris and Shelah resolve a related 70-year-old question about whether one infinity (call it p) is smaller than another infinity (call it t). They proved the **two are in fact equal**, much to the surprise of mathematicians.

"It was certainly my opinion, and the general opinion, that p should be less than t," Shelah said.

Malliaris and Shelah published their proof last year(opens a new tab) in the Journal of the American Mathematical Society and were honored this past July(opens a new tab) with one of the top prizes in the field of set theory. But their work has ramifications far beyond the specific question of how those two infinities are related. It opens an unexpected link between the sizes of infinite sets and a parallel effort to map the complexity of mathematical theories.

Many Infinities
The notion of infinity is mind-bending. But the idea that there can be different sizes of infinity? That's perhaps the most counterintuitive mathematical discovery ever made. It emerges, however, from a matching game even kids could understand.

Suppose you have two groups of objects, or two "sets," as mathematicians would call them: a set of cars and a set of drivers. If there is exactly one driver for each car, with no empty cars and no drivers left behind, then you know that the number of cars equals the number of drivers (even if you don't know what that number is).

In the late 19th century, the German mathematician Georg Cantor captured the spirit of this matching strategy in the formal language of mathematics. He proved that **two sets have the same size, or** "**cardinality**," when they can be put into **one-to-one correspondence** with each other — when there is exactly one driver for every car. Perhaps more surprisingly, he showed that this approach works for infinitely large sets as well.

Consider the natural numbers: 1, 2, 3 and so on. The set of natural numbers is infinite. But what about the set of just the even numbers, or just the prime numbers? Each of these sets would at first seem to be a smaller subset of the natural numbers. And indeed, over any finite stretch of the number line, there are about half as many even numbers as natural numbers, and still fewer primes.

Yet infinite sets behave differently. Cantor showed that there's a one-to-one correspondence between the elements of each of these infinite sets.

1	2	3	4	5	…	(natural numbers)
2	4	6	8	10	…	(evens)
2	3	5	7	11	…	(primes)

Because of this, Cantor concluded that all three sets are the same size. Mathematicians call sets of this size “countable,” because you can assign one counting number to each element in each set.

After he established that the sizes of infinite sets can be compared by putting them into one-to-one correspondence with each other, Cantor made an even bigger leap: He proved that some infinite sets are even larger than the set of natural numbers.

Lucy Reading-Ikkanda/Quanta Magazine

Consider the real numbers, which are all the points on the number line. The real numbers are sometimes referred to as the “continuum,” reflecting their continuous nature: There’s no space between one real number and the next. Cantor was able to show that the real numbers can’t be put into a one-to-one correspondence with the natural numbers: Even after you create an infinite list pairing natural numbers with real numbers, it’s always possible to come up with another real number that’s not on your list. Because of this, he concluded that the set of real numbers is larger than the set of natural numbers. Thus, a second kind of infinity was born: the uncountably infinite.

2. IVI:

Space colonization is inherently and intrinsically rooted in racism, genocide, and patriarchy – political elites and billionaires are creating a nationalist society at the expense of social welfare provisions and environmental protection. The rhetoric of space colonization policies alone causes embodied harm to vulnerable populations.

Haskins 18 – Caroline Haskins, staff writer at Vice, 2018 (“THE RACIST LANGUAGE OF SPACE EXPLORATION,” August 14th, Available Online at , Accessed 09-10-2019)

On Thursday, Vice President Mike Pence, head of the National Space Council, outlined plans for creating the “Space Force” that President Donald Trump envisions as a space-dedicated military branch, complete with space warfighters and weapons, by the year 2020. Back in June, Trump explained the Space Force by **using the language of Plessy v. Ferguson**, the 1896 Supreme Court decision which ruled that racial segregation was constitutional, giving states and municipalities the authority to enact Jim Crow laws. "We are going to have the Air Force and we are going to have the Space Force, **separate but equal**, it is going to be something so important,” Trump said. He just as easily could have said, “The Space Force will be a branch of the military, like the Air Force,” but he did not. Trump is far from the first or only person to use the language of colonization to make a pro-space venture argument. Elon Musk famously describes his plans for a Martian settlement as a “colony,” and a long lineage of space pundits, politicians, and thinkers invoke the history of colonizers and colonization in order to frame the future of humanity in space. During a July 25 hearing of the Subcommittee on Space, Science, and Competitiveness titled “Destination Mars – Putting American Boots on the Surface of the Red Planet,” subcommittee head, Texas Sen. Ted Cruz said that he believes that the first trillionaire on earth will make their money from space exploration. “I don’t know who it will be, and I don’t know what they will discover, or what they will accomplish,” Cruz said. “But I think it is every bit as vast and promising a **frontier** as the New World was some centuries ago.” “You could argue that **the effort to colonize** space is likely to involve **new forms of inequality**: shifts in tax revenues and administrative priorities devoted to that,” said Michael Ralph, a professor of anthropology at NYU. “

Not nearly enough work has been done here on Earth to ensure that these structural inequalities wouldn’t carry through. “Those narratives do carry specific implications about how people living on other worlds might be structured,” Lucianne Walkowicz, the current Chair of Astrobiology at the Library

of Congress, told The Outline. Walkowicz organized the Decolonizing Mars Conference that took place on June 27 as well as a public follow-up event planned for September, to discuss how colonial language is shaping our potential future in space. "Space is not just built for nothing, it's built for people." When we think about humanity's potential to exist on other planets, **it's important to consider who won't have access to space**, in part due to a **total lack of concern** over these issues by people who are able to access it. Amazon CEO Jeff Bezos intends to make space a place for the rich to use for adventure leisure, and SpaceX/Tesla founder Elon Musk has proposed that a Martian "colony" can save a selection of humanity from the collapse of civilization in some World War III scenario. Granted, right now, these are just words from billionaires who want to excite the public about their business ventures. But they suggest that **if the economically and socially vulnerable are priced out of a life-saving journey from Earth, it is a justifiable loss.** "**All of these things that are said off the cuff** [by billionaires] **have some implications that are concrete** and count some people in, and some people out," Walkowicz said. Part of that concern is fueled by the fact that Cruz and Pence have presented the path to settling space as one that will be privately funded, but lead by the U.S. government. In the Destination Mars subcommittee meeting, Cruz said, "At the end of the day, the commercial sector is going to be able to invest billions more in dollars in getting this job [of getting to Mars] done." In his Thursday remarks regarding the Space Force, Pence also implied that celestial territories would be treated as private property (even though owning private property in space is explicitly illegal per the Outer Space Treaty, which the U.S. and dozens of other nations signed in 1967). "While other nations increasingly possess the capability to operate in space, not all of them share our commitment to freedom, to private property, and the rule of law," Pence said. "So as we continue to carry American

Drop the debaters -- sets norms and punish them for not acknowledging their use of colonialist rhetoric rooted in racism in the round, which results in real world violence

No RVIs -- it's illogical to win for being fair, there's no time skew since it's just one card, and RVIs would chill genuine theory

3. 1AC beckstead is about colonisation of the virgo supercluster -- even if we colonise Mars earlier, it doesn't mean we colonise Virgo
    a. There's always fundamental technology barriers unrelated to space—if we colonise mars earlier, it doesn't mean we figure out the theoretical physics before we try the colonisation

4. **Mars colonization impossible for the next 200 years.**

Paula **Tsoni 23**, reporter for Greek Reporter, 2/11/2023, "Colonization Of Mars Practically Impossible, Says Greek-American Space Expert,"
https://greekreporter.com/2023/02/11/colonization-mars-practically-impossible-says-greek-american-space-expert/, kav

Greek-American space exploration scientist Dr Stamatios Krimigis told a TV interview on Thursday that the colonization of Mars is **practically impossible**, at least for the next 200 years.

Speaking to journalist Nikos Chatzinikolaou on Greek private network Ant1 TV, Dr Krimigis opined that Elon Musk, a passionate advocate of the colonization of Mars, hasn't realized the actual difficulties of such a venture.

"Manned missions for **visit** and **exploration**, that is something else, but colonization, **certainly not**," the acclaimed space expert said.

SpaceX, the rocket company co-founded by Elon Musk in 2002, has made it an ultimate goal to send manned flights to Mars and eventually colonize the Red Planet.

The billionaire businessman stated recently that a manned mission to Mars could happen as early as 2029 when asked on Twitter.

Colonization of Mars not possible "in Elon Musk's era"

This isn't the first time that the Greek space exploration scientist doubts the feasibility of human colonization of Mars. In a previous interview with AMNA in spring 2022, he had called plans of a human settlement on Mars a distant dream.

Dr Krimigis, who has a PHD in the ways that **particles** are diffused during solar explosions, now went into **more detail** and explained to Greek talk show host Chatzinikolaou that humans on Mars would be **completely unprotected** in the event of a solar explosion due to the lack of magnetic fields and an atmosphere on the Red Planet.

If they were to colonize Mars, humans would need **shelters** dug at least one metre **underground** to protect themselves from such events, he added. And while that could perhaps be feasible in 200 years from today, it will not be so "in Elon Musk's era."

3. **Mars colonization causes infectious diseases AND turns the case.**

Lackey '18 (Katherine; Money NOW Editor @ USA Today; December 18; "Dangerous life on Mars? Humans could be infected and we could kill microbes on the Red Planet"; ; accessed 7/27/19; MSCOTT)

Throughout history, every time humans have explored new places, one of the biggest issues we have faced is **inf(e)ctious diseases** – on both sides.

Not only did **explorers bring pathogens** to local populations whose immune systems couldn't fight off an unfamiliar disease, but those **locals also harbored bacteria and viruses that infected the adventurers**.

So what happens if there's life on Mars and humans travel there?

"Anytime there's a new introduction, on both sides, there's a lot of risks. We all can be harboring things that can create risk for the other side," said Pardis Sabeti, professor of immunology and infectious diseases at Harvard University. "There's all sorts of ways that when different life forms interact for the first time, all sorts of intentional and **unintentional destruction can happen**."

NASA has been sending rovers to Mars for decades, including InSight, which recently landed there, but the landers get throughly scrubbed before they're launched into space. And none of the vehicles have made a return trip to Earth.

With human travel to Mars on the horizon – NASA recently put the timetable at least 25 years – we must be prepared for the potential that a **Martian microbe could harm us**, said Sabeti, who speaks about that

4. **---life on Mars would be miserable. No one would go.**

Dvorsky 19, senior staff reporter @ Gizmodo; citing Briony Horgan, assistant professor of planetary science at Purdue University. (George, 7-30-2019, "Humans Will Never Colonize Mars", Gizmodo,)

Until such time, an un-terraformed Mars will present a **hostile setting** for venturing pioneers. First and foremost there's the **intense radiation** to deal with, which will confront the colonists with a constant health burden.

Horgan said there are many big challenges to colonizing Mars, with radiation exposure being one of them. This is an "issue that a lot of folks, including those at SpaceX, aren't thinking about too clearly," she told Gizmodo. Living underground or in shielded bases may be an option, she said, but we have to expect that cancer rates will still be "**an order of magnitude greater**" given the added exposure over

s "Purgatory."

Nuclear War Causes Extinction

1. Nuclear war spurs system collapse AND pandemics, which are

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Humanity is facing its **greatest test** in the million-year ascent of our kind. This isn't a **single** challenge. It's a **constellation** of **huge man-made threats**, now coming together to **overshadow** our civilisation's stability and even, maybe, its **future survival**. These ten intersecting risks are: ecological collapse, resource depletion, weapons of mass destruction, climate change, global poisoning, food insecurity, population and urban failure, pandemic disease and uncontrolled new technologies (like killer robots, artificial intelligence and universal surveillance) – reinforced by a prodigious capacity for human self-delusion. But sticking our heads in the sand and trying to ignore them will not remove the danger. These threats are known as **'existential risks'** because they imperil our **future existence**, both as individuals, as a civilisation and maybe even as a **species**. Their most important feature is the fact that they are **not isolated** from one another. They are **deeply interwoven**. They **play into** and **feed one another**. They **cannot be addressed separately** or singly, because to do so creates a situation where curbing one risk only makes other risks worse. Together they constitute a **single existential emergency** facing **all of humanity**. An example of why they cannot be addressed piecemeal is trying to solve the global food problem by intensifying agriculture worldwide using fossil fuels, fertilisers and petrochemicals: this will only destroy the very climate, resources and ecosystem services on which agriculture, itself, depends – and is not, consequently, a viable or enduring solution. Other answers must be sought. Another example is that trying to end the Sixth Extinction of wildlife on our planet by turning half of it back to forest and grassland will not work on its own, because it would involve the sacrifice of half the current human food supply: consequently, we need a solution that achieves both aims – sustainable food for all and a sufficient haven for the Earth's other species. So, the problem of extinction needs to be solved, in part, by solving the problem of food – and that, in turn, entails solving the problems of climate, global poisoning, resource depletion and other mega-risks. It is absolutely clear from this that the solutions we adopt must be cross-cutting. They must comprehensively address all the perils we face, not just one or a handful of them. Take these ten great risks together and what you have is the focal issue of our time – the greatest and most profound challenge ever to confront human civilisation. The risks are all selfinflicted, a direct result of the overgrowth in human numbers and our unbridled demands on the planet – for food, resources, space and a healthy environment. By solving them together, we ensure our future. By denying them or failing to solve them all in time, we knowingly create untold misery and suffering for most of humanity and generations to come through the centuries ahead. We are gambling with the very survival of our civilisation and species. The risks are described below, along with observations about how they play into the Food or War scenario. The detail, the scientific sources and the solutions, collective and individual, to each risk are described in more detail in Surviving the 21st Century. Extinction and Ecological Collapse More than half of the large animals that once inhabited the Earth have been wiped from it by human action since 1970, according to the Worldwide Fund for Nature's Living Planet Index.3 So, too, have half the fish in the sea on which humans rely for food.4 Humans are, in the words of the great biologist E. O. Wilson, 'tearing down the biosphere', demolishing the very home that keeps us alive.5 Extinction, it should be noted, is a part of life: 99.9 per cent of all species ever to evolve on this planet have disappeared, and new ones like ourselves have arisen to replace them. But extinction rates like today's – a hundred to a thousand times faster than normal – are a freak occurrence that usually takes tens of millions of years, not mere decades. Animal, plant and marine species are presently vanishing so fast that scientists have dubbed our time "the Sixth Extinction" – the sixth such megadeath in the geological history of the Earth.6 By the end of the present century, Wilson says, it is possible that up to half of the eight million species thought to exist here will be gone. Furthermore, in all previous extinctions, natural events like asteroid strikes and vast volcanic outbursts have been to blame. This will be the only time in the Earth's history when the wipe-out was caused by a single species. Us.7 The probability of humans becoming extinct during the twentyfirst century is not high – but there are scenarios, such as an all-out nuclear war, runaway climate change (+5–10 C or more), or a compound collapse in the Earth's main life support systems, in which it must be regarded as a possibility – and the fact that it is unpleasant to contemplate is no excuse for doing nothing to stop it. However, there are also a number of credible scenarios in which large-scale ecosystem collapse could endanger civilisation and cause very high mortality among the world's population. These revolve around the notion of 'environmental security' which is, in turn, very closely tied to human security – i.e. peace or war. An ecosystem is a biological community of mutually dependent species – and the removal of one species after another can undermine it and render it dysfunctional, in the same way that pulling one brick at a time out of your home will eventually cause it to fall down. Ecosystems support all life on the planet, and maintain the quality of air, water and soil on which it depends. For humans, they provide food and clean water (provisioning services), disease and climate regulation (regulatory services), spiritual and aesthetic fulfilment (cultural services), useful chemical energy (from plants) and soil formation (support services). As ecosystems decay, the decline and loss of these services often causes significant harm to human wellbeing and can inflame the tensions that lead to conflict. The most destructive object on the planet, as we noted in Chapter 3, is the human jawbone. The need to keep it fed is responsible, every year, for the loss of up to 75 billion tonnes of topsoil, the wasting of six trillion tonnes of water, the release of five million tonnes of pesticides, and 30 per cent of the world's climate-wrecking carbon emissions. In addition, the contemporary food system is the chief driver of deforestation, desertification, wildlife extinctions and impaired ecosystems. Among the most striking examples of food's impact on the wild world are the 400+ 'dead zones' spreading through the world's oceans from the Arabian Sea, to the Baltic and the Mississippi delta. These are oxygenless layers in the sea, where fish cannot survive. They are caused by topsoil dislodged by land clearing, over-farming and over-grazing, the use of huge quantities of artificial fertilisers, toxic chemicals and human sewage. Along with overfishing they contribute to an ongoing collapse in world wild fisheries and are a clear example of how the activity of one part of the food system can impair another. Similarly, most inland rivers and lakes in populated regions are eutrophic and polluted – and no longer capable of producing as much food as in the past. The loss of wild fisheries increases tensions between nations and fishers over what remains and can lead to 'fish wars'. 8 The existing global food production system is therefore a major contributor to the decline and failure of ecosystem services needed to support the human population. This in turn rebounds on the food system itself. Furthermore, the extinction of wild animals and plants deprives the food industry of many edible species that may be needed as part of a healthy, diverse global diet in future. The solution to the extinction crisis is to cease farming and grazing on about half the currently farmed area of the planet (25 million square kilometres), transfer food production to the cities where it can take advantage of all the nutrients and water currently being wasted, and employ many of the world's farmers and indigenous people as Stewards of the Earth to manage the rewilding and regeneration of former farmlands. Food production can continue on the remaining 24 million square kilometres using eco-agriculture. This process is further described in Surviving the 21st Century and in Chapter 9 of this book. How the existing food system plays into the risk of war can also be viewed through the lens of environmental security: war damages environments, making it harder for humans to sustain and feed themselves – and ruined environments themselves become cauldrons of war. This is plainly to be seen in the cases of Syria, South Sudan, Yemen and the Horn of Africa. What we most need are food systems that do not cause knock-on damage to either the environment and wildlife, the climate, the oceans or to consumer health – and which ease tensions, so promoting peace, not conflict. These are described in Chapters 8 and 9. Resource Scarcity The average citizen of planet Earth today uses at least ten times the volume of resources used by their grandparents a century ago. Since the human population has also quadrupled over the same time, this means humanity's gargantuan appetite for minerals, metals, timber, water, food and energy has grown fortyfold in barely a hundred years. As the Global Footprint Network explains, we are presently using enough 'stuff' for 1.6 Earths, not just the one we have. We now outrun the Earth's natural ability to supply our needs in August each year.9 As with the mining of groundwater, the decline and collapse of global resources like soil, water and phosphorus, is often imperceptible to the individual: people have simply no idea they are living on borrowed time and, with that, comes enormous risk. To make the issue of resource consumption a little more personal: you (as an average individual citizen of the planet) will in your lifetime – use 99,720 tonnes (i.e. 40 Olympic pools) of fresh water – displace 750 tonnes of topsoil – consume 720 tonnes of metals and materials – use 80 billion joules of energy – release 288 tonnes of CO_2 – release 320 kilograms of toxic chemicals – waste 13.4 tonnes of food – destroy 800 square metres of forest. Because of the long, cryptic, industrial and international trade chains which hide it, most of us are unaware of the vast damage we do to the planet through our simple habit of shopping. Yes, some of us have a notion that some of our purchases may be bad for gorillas in the Congo, orangutans in Borneo or flamingos in the Atacama – but we mostly have no true appreciation of the wider havoc we inflict on the Earth and its natural systems by the 'innocent' act of consumption, which business and governments try constantly to convince us is essential to 'growth and jobs'. It should therefore come as no surprise that the world finds itself increasingly short of key resources like fresh water, soil, phosphorus, timber and certain minerals – and that these shortages are giving rise to tensions and even to conflicts. Indeed, resource scarcity has for some time been considered by strategic experts to be one of the most likely causes of war in the twentyfirst century.10 However, people are not equally responsible for the devastation of Planet Earth. The diagram below (Figure 6.1), from [[FIGURE 6.1 OMITTED]] Oxfam, illustrates how just one tenth of humanity consumes five times as much in the way of material resources (expressed here in the form of their carbon footprint) as the poorest half of the world population. The affluent are chiefly responsible for the destruction taking place on a global scale as they seek to sustain lifestyles that the planet can no longer afford or support. The significance of this blind spot around consumption for global food security is very great. As described in earlier chapters, the world food system depends critically on soil, water, nutrients and a stable climate, to supply humanity's daily need for nutriment – and all of these essential resources are in increasingly short supply, chiefly because of our own mismanagement of them and our collective failure to appreciate that they are finite. On current trends, the existing food system will tend to break down, first regionally and then globally, owing to resource scarcity from the 2020s onward, and especially towards the mid century – unless there is radical change in the world diet and the means by which we feed ourselves. This will lead to increasing outbreaks of violence and war. Nobody, neither rich nor poor, will escape the consequences. Weapons of Mass Destruction Detonating just **50**–100 out of the global arsenal of nearly 15,000 **nuclear weapons** would **suffice to end civilisation** in a **nuclear winter**, causing **worldwide famine** and **economic collapse** affecting even **distant** nations, as we saw in the previous chapter in the section dealing with South Asia. **Eight nations** now have the power to **terminate civilisation** should they desire to do so – and **two** have the power to **extinguish the human species**. According to the nuclear monitoring group Ploughshares, this arsenal is distributed as follows: – Russia, 6600 warheads (2500 classified as 'retired') – America,

6450 warheads (2550 classified as ‘retired’) – France, 300 warheads – China, 270 warheads – UK, 215 warheads – Pakistan, 130 warheads – India, 120 warheads – Israel, 80 warheads – North Korea, 15–20 warheads.11 Although actual numbers of warheads have continued to fall from its peak of 70,000 weapons in the mid 1980s, scientists argue the **danger** of nuclear conflict in fact **increased** in the first two decades of the twenty-first century. This was due to the **modernisation** of existing stockpiles, the adoption of dangerous new **tech**nologies such as robot delivery systems, hypersonic missiles, **a**rtificial **i**ntelligence and **e**lectronic **w**arfare, and the continuing **leakage** of nuclear **materials** and **knowhow** to nonnuclear nations and potential terrorist organisations. In early 2018 the hands of the ‘Doomsday Clock’, maintained by the Bulletin of the Atomic Scientists, were re-set at two minutes to midnight, the highest risk to humanity that it has ever shown since the clock was introduced in 1953. This was due not only to the state of the world’s nuclear arsenal, but also to irresponsible language by world leaders, the growing use of social media to destabilise rival regimes, and to the rising threat of uncontrolled climate change (see below).12 In an historic moment on 17 July 2017, 122 nations voted in the UN for the first time ever in favour of a treaty banning all nuclear weapons. This called for comprehensive prohibition of “a full range of nuclear-weapon-related activities, such as undertaking to develop, test, produce, manufacture, acquire, possess or stockpile nuclear weapons or other nuclear explosive devices, as well as the use or threat of use of these weapons.”13 However, 71 other countries – including all the nuclear states – either opposed the ban, abstained or declined to vote. The Treaty vote was nonetheless interpreted by some as a promising first step towards abolishing the nuclear nightmare that hangs over the entire human species. In contrast, 192 countries had signed up to the Chemical Weapons Convention to ban the use of chemical weapons, and 180 to the Biological Weapons Convention. As of 2018, 96 per cent of previous world stocks of chemical weapons had been destroyed – but their continued use in the Syrian conflict and in alleged assassination attempts by Russia indicated the world remains at risk.14 As things stand, the only entities that can afford to own nuclear weapons are nations – and **if humanity is to be wiped out**, it will **most likely** be as a **result of an atomic conflict** between nations. It follows from this that, if the world is to be made safe from such a fate it will need to get rid of nations as a structure of human self-organisation and replace them with wiser, less aggressive forms of self-governance. After all, the nation state really only began in the early nineteenth century and is by no means a permanent feature of self-governance, any more than monarchies, feudal systems or priest states. Although many people still tend to assume it is. Between them, nations have butchered more than 200 million people in the past 150 years and it is increasingly clear the world would be a far safer, more peaceable place without either nations or nationalism. The question is what to replace them with. Although there may at first glance appear to be no close linkage between weapons of mass destruction and food, in the twentyfirst century with world resources of food, land and water under growing stress, nothing can be ruled out. Indeed, chemical weapons have frequently been deployed in the Syrian civil war, which had drought, agricultural failure and hunger among its early drivers. And nuclear conflict remains a distinct possibility in South Asia and the Middle East, especially, as these regions are already stressed in terms of food, land and water, and their nuclear firepower or access to nuclear materials is multiplying. It remains an open question whether panicking regimes in Russia, the USA or even France would be ruthless enough to deploy atomic weapons in an attempt to quell invasion by tens of millions of desperate refugees, fleeing famine and climate chaos in their own homelands – but the possibility ought not to be ignored. That nuclear war is at least a possible outcome of food and climate crises was first flagged in the report The Age of Consequences by Kurt Campbell and the US-based Centre for Strategic and International Studies, which stated ‘it is clear that even nuclear war cannot be excluded as a political consequence of global warming’. 15 Food insecurity is therefore a driver in the preconditions for the use of nuclear weapons, whether limited or unlimited. A **global famine** is a **likely outcome** of **limited use** of **nuc**lear weapon**s** by **any country** or countries – and would be **unavoidable** in the event of an **unlimited nuclear war** between **America and Russia**, making it **unwinnable** for either. And **that**, as the mute hands of the ‘Doomsday Clock’ so eloquently admonish, is also the **most likely scenario** for the **premature termination of the human species**. Such a grim scenario can be alleviated by two measures: the voluntary banning by the whole of humanity of nuclear weapons, their technology, materials and stocks – and by a global effort to secure food against future insecurity by diverting the funds now wasted on nuclear armaments into building the sustainable food and water systems of the future (see Chapters 8 and 9). Climate Change The effects of food and war on climate change as it is presently predicted to occur were described in Chapter 3: in brief, the stable climate in which agriculture arose over the past 6000 years is now becoming increasingly unstable as a result of the billions of tonnes of carbon that humans are injecting into the atmosphere and oceans, forming a colossal heat engine to drive more frequent, violent weather. This in turn impairs food production in regions of the world already facing severe stresses from population growth and resource depletion. Military analysts describe climate change as a ‘threat multiplier’, augmenting the tensions, conflict and instability which already exist. In reality it is a feedback loop, in which worsening climate conditions cause greater food insecurity, which is met by measures (like increased land clearing and use of fossil fuels and chemicals), which in turn worsen climate conditions, which worsen food security, which cause wars, which inflict more eco-damage… Two degrees (2 C) of global warming – described as the danger point for humanity – are predicted to occur well before 2050 because of our collective failure to curb our carbon emissions.16 Those 2 C of warming portend bad things for any food system that depends on the weather – but just how bad cannot easily be forecast as both the climate state and the response of the global food system are governed by human behaviour, which is fairly unpredictable. Current estimates suggest crop losses of the order of 20–50 per cent at the very time we are trying to raise food output by 50–70 per cent. What can be confidently predicted, however, is that there will be an increase in both the frequency and scale of harvest failures and agricultural disease outbreaks around the world as we approach the mid century – and that beyond 2 C of warming it will become very hard indeed to maintain a stable outdoors, agriculture-based system to meet an anticipated doubling in world demand for food by the 2060s. The ‘worst case’ risk of this, as previously outlined, would be ten billion people having to subsist on enough food to feed only four billion. That, however, is by no means the worst case of the climate story. There are ominous signs that humans have already unleashed planetary forces over which we have absolutely no control – and that these, should they become large enough, will take charge of the Earth’s climate engine and drive it into a superheated condition of +9–10 C or even higher. Today, more people are aware that global warming may lead to complete melting of all glaciers and the polar ice-caps, thereby raising sea levels by 65 metres and inundating almost all of the world’s seaboard cities, fertile river deltas and coastal plains.17 This would clearly have a devastating effect on coastal food production. However, this process will probably take several centuries, allowing populations ample time to relocate inland. That sea levels previously rose by a similar quantum at the end of the last Ice Age, flooding part of Australia, severing Britain from Europe and America from Asia, is proof enough that such events occur as a regular part of the Earth’s warming and chilling cycles. The great existential threat to humanity lies in vast stores of frozen methane gas (CH4) locked into the soils of the tundra regions of Canada and Siberia, in colossal deposits of frozen methane on the continental seabed surrounding the Arctic Ocean, and in massive stores of methane submerged in peat deposits and swamps in places such as the Amazon and the wet tropical forests of Southeast Asia and Africa. Methane is a gas with 20–70 times the climate-forcing power of carbon dioxide. These deposits are the accumulation of the slow decomposition of planet and animal matter in the Earth’s sediments over several hundred million years – they are identical in origin to the gas bubbles that surface when we stir the bed of a pond or lake. The actual volume of these methane deposits is still being assessed by science. Recent estimates suggest: • seabed deposits – between 500–2500 billion tonnes of frozen carbon;18 • tundra deposits – potentially emitting 180–420 million tonnes of carbon a year by 2100; and • tropical peat swamps – could emit 480–870 million tonnes of carbon a year by 2100.19 That carbon released from peat swamps, tundra and possibly the oceans can have a catastrophic effect on the Earth’s climate is foreshadowed by an event known as the Palaeocene–Eocene Thermal Maximum (PETM), which took place some 55 million years ago, when Earth took a sudden fever and its temperature rocketed upwards by +5–9 C. This ‘heat spike’ caused a lesser extinction event involving widespread loss of ocean life and a smaller toll of land animals.20 However, the heating occurred over a much longer period – 100–200,000 years, compared with human-driven heating (50–100 years) – and is thought to have been mainly caused by the drying out and burning of tropical peat swamps as the climate warmed. However, the volume of carbon which caused this sharp planetary heat spike in the past is estimated to be barely a tenth of that released by humanity today.21 Today, human activity in clearing rainforests, draining swamps and burning the world’s forests to open them up for farming and food production is releasing vast amounts of methane and CO2. Explosion craters have been reported across Canada and Siberia as frozen methane deposits well up and erupt with the melting of the tundra. And scientists from Sweden, Russia, Canada and America have reported methane bubbling from the seabed of the Arctic Ocean, though not yet in massive volumes. The risk in all this is that, by warming the planet by only 1–2 C, we have set in train natural processes that we are powerless to control, setting ourselves on an inescapable trajectory to a Hothouse Earth, 5–10 C or more above today’s levels. Although it is hard to estimate, some scientists are of the view that fewer than one billion humans would survive such an event22 – in other words, nine people out of every ten may perish in the cycle of famines, wars, heatwaves and pandemic diseases which global overheating would entail. This underlies the deadly urgency of ceasing to burn all fossil fuels, locking up as much carbon as possible and re-stabilising the Earth’s climate. In that, food production can and will play a central role. Poisoned Planet ‘Earth, and all life on it, are being saturated with man-made chemicals in an event unlike anything which has occurred in all four billion years of our planet’s story. Each moment of our lives, from conception unto death, we are exposed to thousands of substances, some deadly in even tiny doses and most of them unknown in their effects on our health and wellbeing or upon the natural world. These enter our bodies with every breath, each meal or drink, the clothes we wear, the products with which we adorn ourselves, our homes, workplaces, cars and furniture, the things we encounter every day. There is no escaping them. Ours is a poisoned planet, its whole system infused with the substances humans deliberately or inadvertently produce in the course of extracting, making, using, burning or discarding the many marvellous products on which modern life depends. This explosion in chemical use and release has all happened so rapidly that most people are blissfully unaware of its true magnitude and extent, or of the dangers it now poses to us all as well as to future generations for centuries to come.’ This is a summation of the chemical crisis facing all of humanity, as well as all life on Earth, which I wrote in Surviving the 21st Century, and which is based on the extensive scientific research reported in Poisoned Planet.23 It is a crisis with profound impact for everyone. According to the medical journal The Lancet, nine million people – one in six – die every year from chemical pollution of their air, water, food and living environment.24 A further 40 million die from the so-called noncommunicable or ‘lifestyle’ diseases (NCDs), cancer, heart disease, diabetes and lung disease, which are mostly diet-related.25 Food production, as we have seen, is deeply implicated in the chemical deluge. However, it is also an existential threat to human health, both in terms of infectious disease and the new ‘lifestyle’ diseases. No-one to my knowledge has compiled an accurate assessment of the total chemical effusion of humanity or presented a realistic impression of its true scale. Box 6.1 represents my own best estimate, drawn from various reliable sources. From this it can easily be seen that the scale of humanity’s chemical assault on ourselves and on the planet is many times the scale of our climate assault – yet this issue commands nowhere near the political or scientific priority that it should. It is arguably the most under-rated, under-investigated and poorly understood of all the existential threats to humanity. The poisoning of the Earth by human activities has grave implications for the health and safety of the global food chain and its eight billion consumers. It is not only the use of chemicals in food production that is of concern, but also the contamination of water, soils and livestock by industrial pollutants from other sources, such as mining or manufacturing. It is also the disruption of vital services such as pollination by insects of a [[BOX 6.1 OMITTED]] third of the world’s food crops and 90 per cent of wild plants.26 It is the contamination of up to three quarters of the world fish catch with microscopic plastic particles and clothing microfibres made by the petrochemical industry.27 The ending of this flood of poisons is a prerequisite for a safe, healthy and sustainable global food supply in future. And, since government regulation has largely failed to stem the worldwide flood, the task now falls to consumers – to choose foods which have been produced by safe methods and shun foods produced by unsafe methods. That is the only way that the food industry can be encouraged (and penalised) into doing the right thing by humanity and the planet: by consumers rewarding it for producing clean food and punishing it for toxic food. Otherwise it will continue to pollute as profitably as it can. It follows that the urgent global education of consumers about which foods are safe and which are toxic is also a pre-requisite. Food Security Our demand for food is set to double by the 2060s – potentially the decade of ‘peak people’, the moment in history when the irresistible human population surge may top out at around 10 billion. However, as we have seen, many of the resources needed to supply it agriculturally could halve and the climate for the growing of

food outdoors become far more hostile. Why **food insecurity** is an **existential threat to humanity** should, by now, be abundantly clear from the earlier chapters of this book: present systems are **unsustainable** and, as they **fail**, will pose risks **both to civilization** and, should these **spiral into nuclear conflict**, to the **future of the human species.** The important thing to note in this chapter is that food insecurity plays into **many, if not all, of the other existential threats** facing humanity. The food sector's role in **extinction**, **resource scarcity**, global **toxicity** and potential **nuclear war** has **already** been explained. Its role in the **suppression of conflict** is discussed in the next chapter. Its role in **securing the future of the megacities**, and of a largely **urbanised humanity**, is covered in Chapter 8. And its role in **sustaining** humanity through the **peak in population** and **into a sustainable world beyond** is covered in Chapter 9. Food **clearly** has a **pivotal** role in the future of human population – both as a driver of population growth when supplies are abundant and as a potential driver of population **decline**, should food chains collapse. It is no **exaggeration to state that the fate of civilisation depends on it**. Pandemic Disease **Disease pandemics** have been a well-known **existential** risk to humanity since the **plague of Athens** in 430 BC – itself linked to a war. However, a point that escapes many people nowadays is that, as humans have become **so numerous** – indeed the predominant lifeform on the planet – we have also become the major food source for many microbes. We are now the 'living compost heap' on which they must dine and in which they must reproduce, if they are themselves to survive. As our own population grows, pandemics are thus **likely to increase**, as more and more viruses and bacteria are forced to take refuge in humans following the depletion or total extinction of their natural hosts, the wild animals we are exterminating. This process is greatly assisted by our creation of megacities, tourism and air travel, schools and child-minding centres, air-conditioned offices, night clubs, sex with strangers, pet and pest animals, insects which prosper from climate change or human modification of the environment (like mosquitoes), ignorance, poor public hygiene, lack of clean water, and deficient food processing and handling. So, while humanity is confronted with an **ever-expanding array of parasites**, we are simultaneously doing everything in our power to **distribute them worldwide in record time** – and to **seed new pandemics**. The **W**orld **H**ealth **O**rganisation has identified **19** major **infectious diseases** with potential to become **pandemic**: chikungunya, cholera, Crimean-Congo haemorrhagic fever, Ebola, Hendra, influenza, Lassa fever, Marburg virus, meningitis, MERS-CoV, monkeypox, Nipah, plague, Rift Valley fever, SARS, smallpox, tularaemia, yellow fever and Zika virus disease.28 While none of these is likely to fulfil the Hollywood horror movie image of wiping out the human species – for the simple reason that viruses are usually smart enough to weaken to a sublethal state once comfortably ensconced in their new host – the **apocalyptic horseman** representing Pestilence and Death will nevertheless continue to play a **synergetic role** with his companions **warfare**, **famine**, climate change, global poisoning, ecological collapse, urbanisation and **other existential threats**. **Food insecurity** affects the **progression of pandemic diseases**, often in ways that are not entirely obvious. First, **new pandemics** of infectious disease tend to originate in developing regions where **nutritional levels are poor** or agricultural practices favour the evolution of novel pathogens such as, for example, the new flu strains seen every year – which arise mainly from places where people, pigs and poultry live side-by-side and shuffle viruses between them – and also novel diseases like SARS and MERS. Second, because totally unknown diseases tend to arise first in places where rainforests are being cut down for farming and viruses hitherto confined to wild animals and birds make an enforced transition into humans. Examples of novel human diseases escaping from the rainforest and tropical savannah in recent times include HIV/AIDS, Hendra, Nipah, Ebola, Marburg, Lassa and Hanta, Lujo, Junin, Machupo, Rift Valley, Congo and Zika.29 And thirdly, because the loss of vital micronutrients from heavily farmed soils and from food itself predisposes many populations to various deficiency diseases – for example, a lack of selenium in the diet has been linked with increased risk from both HIV/AIDS and bowel cancer.30 A key synergy is the way **hunger and malnourishment exacerbate** the spread of disease, classic examples being the **1918** Global Flu **Pandemic** which spread rapidly among **war-starved populations**, or the more recent cholera outbreak in war-torn Yemen. In a fresh twist, Dr Melinda Beck of North Carolina University has demonstrated that **obesity** – itself a form of malnutrition – may cause increased deaths from influenza by both aiding the virus and suppressing the patient's immune response.31

2. Nuclear war produces powerful anti-gravitational effects that generate atmosphere-sucking tornadoes causing extinction

Dr. Stoyan **Sarg 15**, PhD Physics, Director of the Physics Research Department at the World Institute for Scientific Exploration, "The Unknown Danger of Nuclear Apocalypse," https://www.foreignpolicyjournal.com/2015/10/09/the-unknown-danger-of-nuclear-apocalypse/, cc recut and reformatted //RX

With the new NATO plan for installation of nuclear tactical weapons in Europe, nuclear missiles may reach Moscow in only 6 minutes, and the opposite case is also possible in the same time. The question is: how can we be sure that this will not be triggered by a human error or computer malfunction. An adequate reaction dictated by the dilemma "to be or not to be" and the concept of preventive **nuclear strike** may lead to a nuclear consequence that is difficult to stop. At the present level of distributed controlled systems and military global navigations, this will lead to **unstoppable global nuclear war**. However, there is something not predicted, of which the military strategists, politicians and powerful forces are not aware. Probably, it will **not** be a **nuclear winter** that they hope to survive in their **underground facilities**. The **most probable** consequence will be a **partial loss** of the **Earth's atmosphere** as a result of one or many **powerful simultaneous tornadoes** caused by the **nuclear explosions**. In a tornado, a powerful **antigravitational** effect takes place. The official science does not have an adequate explanation for this feature due to an incorrect concept about space. The antigravitational effect is not a result of the circling air. It is a specific physical effect in the aether space that is dismissed in physics as it is currently taught. Therefore, the effective height of this effect is not limited to the height of the atmosphere. Then in the case of many simultaneous **powerful tornadoes**, an **effect** of **suction** of the **earth atmosphere into space** might take place. Such events are **observed on the Sun** and the present physical science does not have an explanation for them. The antigravitational effect is accompanied by specific electric and magnetic fields with a twisted shape. This is observed in tornado events on the Sun. Some effects in the upper Earth atmosphere known as sprites have a similar combination of electrical and magnetic fields but in a weaker form. They are also a mystery for contemporary physical science. At the time of **atmospheric nuclear tests**, made in the last century, a number of **induced tornadoes** are observed near the **nuclear mushroom** as shown in Figure 1. The strongest antigravitational effect, however, occurs in the central column of the formed nuclear mushroom. The analysis of underwater nuclear tests also indicates a strong antigravitational effect. It causes a rise of a vertical column of water. In the test shown in Figure 2, the vertical column contains millions tons of water. Thermonuclear bombs are **multiple times more powerful**. The largest thermonuclear bomb of the former Soviet Union tested in 1961 is 50 megatons. It is 3,300 times more powerful than the bomb dropped by USA on Hiroshima at the second world war and may kill millions. It is known that Mars once had liquid water and consequently an atmosphere that has mysteriously disappeared. If the scenario described above takes place, the Earth will become a **dead planet like Mars**. The powerful politicians, military adventurers and their financial supporters must be aware that even the most secured **underground facility** will not save them if a global nuclear conflict is triggered. Their disgraced end will be more miserable than the deaths of the billions of innocent human beings, including the animal world.

AT: Coal prevents reindustrialisation

1. Industrial civilization will just be rebuilt on alternative energy sources – Technology is inevitable.

Belfield 23 (Belfield, Haydn. Haydn has been a Research Associate and Academic Project Manager at the University of Cambridge's Centre. "Collapse, Recovery, and Existential Risk." How Worlds Collapse. Routledge, 2023. 61-92.) PDF: Miguel Centeno, Peter Callahan, Paul Larcey, Thayer Patterson - Ho… YJLI reformatted //RX

To assess the likelihood of a global "**technical recovery**," we can draw on **capital theory.** Theories of long-run economic growth typically rely on models of capital stocks (Cass, 1965; Mankiw et al., 1992; Solow, 1956). Global capi- tal stocks can be categorized into physical, social, human, and natural capital. From the perspective of these capital theories, longterm economic growth (and social development) depends upon the management, combination, and use of these capital stocks (Tzachor, 2020). We can assess the capital stocks likely available in a post-collapse world to assess its prospects for technical recovery.11 Indeed, further work could com- pare that to the capital stocks available at various points of interest, such as 10,000 years ago at the transition to agriculture, cities, and states; or at the transition to the industrial revolution 250 years ago. The better the stocks, the more likely the recovery. For example, humanity was able to develop from the first farmers to our current civilization before: If the capital stocks available in a post-collapse world were better than the stocks existing at the time of the agricultural revolution, then we can be more confident that humanity will be able to repeat its earlier progress. The comparison would also be relevant to an assessment of speed—whether development would be faster in a post-collapse recovery than what was experienced in human history. It would also be rel- evant to an assessment of the likelihood of multiple recoveries. **Physical** (or "manufactured" or "produced") **capital refers to "material goods or fixed assets which contribute to the production process** rather than being the output itself" (Goodwin, 2003). A post-collapse world would have an abundance of physical capital: Transport infrastructure such as roads, bridges, and tunnels; factories with a variety of machinery; and industrial farms with pesticides and agricultural equipment (Dartnell, 2014). Even a small town in most parts of the world would have metal tools, rubber tires, plastic contain- ers, and internal combustion engines—though physical capital may be becom- ing more complex and interdependent, requiring specialized skills to maintain (compare an old car to a modern hybrid). The crops we plant and animals we raise are more productive than even those of a hundred years ago, and dramati- cally so compared to those first domesticated. **Human capital refers to individuals' knowledge, skills, health, and motivation**. The world population is well-educated and skilled compared to human history. Over 80% of the world population has had some formal basic education, compared to less than 20% in 1820 (Roser & Ortiz-Ospina, 2013). Literacy, numeracy, and specialized skills would be important in an industrial recovery. Humanity's collective knowledge includes many topics in science, technology, engineering and mathematics, and medicine. Knowledge of the germ theory of disease, electromagnetism, or crop rotation would be very useful in recovery. An individual's knowledge is lost if they die without passing it on to the next generation. However a post-collapse world would be in a much better situation than, for example, Renaissance Europeans relying on Arabic transla- tions and scraps found in monasteries. Google Books estimates there are at least 146 million books in the world, and this is likely an underestimate (Taycher, 2010). Even a small town in most parts of the world would have homes with books and often a library, with histories, maps, science textbooks, and guides. Average human health is remarkable, with life expectancy the highest in history. Many of the current population are vaccinated against common dis- eases, and many diseases are much less prevalent than at any point in history. Indeed smallpox, possibly the biggest killer in human history, has been eradi- cated (Hopkins, 2002). A post-collapse world does not need to worry about that particular disease. However, increased interaction with new environments has led to novel zoonoses. HIV/AIDS, for example, could be challenging in a world without good diagnostics and antiretrovirals. **As to motivation**, the **demonstration effect** would be **powerful** in a post- collapse world. For example, many people in medieval Europe did not think of

progress as possible. Even in the early modern period, the possibilities of an industrial society were not foreseen—it was not clear for example to Song China that it was worthwhile to invest in coal production and textile manufac- turing (Morris, 2010). Many simple and useful improvements, like the flying shuttle, were not invented until the Industrial Revolution (Howes, 2017). A post-collapse world would be able to see very visibly what had been created before, and that progress and an industrial society were possible. **Social capital** refers to collective institutions such as organizations and norms, the strength of interpersonal networks and connections, and levels of trust in institutions and one another. Social capital is the **strongest predictor of recovery** from small-scale disasters (Aldrich, 2012). It might also be important in a contemporary collapse. Several durable institutions and identities may survive. These include the "imagined communities" (Anderson, 2006) of countries and religions, along with the institutions of the state (with the armed forces being particularly important) and the organized religions tied to them. Even smaller institutions like particular universities, companies, unions, or political parties could plausibly survive. This social capital would likely increase the probability of recovery by diminishing conflict and creating a structure and leadership for rebuilding. Other enduring norms could include even more ideological notions of democracy, freedom, and equality (as I will go on to discuss in the next section). **Natural capital refers to natural assets such as soil, ecologies, water, ores, fos- sil fuels, and climate**. It is here where the picture is much more mixed. There are still huge stocks of natural capital, but they have been significantly depleted over the last 250 years since the industrial revolution. One of the biggest questions for recovery relates to fossil fuels. The pessi- mistic argument goes as follows: A post-collapse industrialized economy relies on easily accessible fossil fuels, and most of the easily accessible fossil fuels have been used, so a post-collapse industrialized economy is unlikely. These prem- ises seem persuasive, but we can question both. On the first premise, humanity has experienced only one industrial revolution, and fossil fuels did enable and sustain it. **However, a recovery of indus- trial society based on renewable resources such as biomass and hydropower could be possible** (Dartnell, 2014). Indeed, the historic industrial revolution may have been possible based on wind, water, and charcoal (Dartnell, 2015; LePage, 2014). Such a recovery would likely be easier if humanity transitions to a low or no-carbon economy this century, as is planned. The second premise doubts the availability of easily accessible fossil fuels. In the past, fossil fuels were remarkably accessible. Coal mining was possible in shallow, unsophisticated mines. Petroleum seeps produced lakes of oil in some parts of North America where one could dip in and fill a jug (Yergin, 1991). We now have deep-sea oil rigs, in inhospitable locations, drilling kilometers down. Less impressionistically, energy companies use a measure of "energy returned on energy invested" (EROEI ratio). This has declined—for exam- ple, for finding oil and gas in the USA from 1200:1 in 1919 to 5:1 in 2007 (Guilford et al., 2011; Hall et al., 2014). However, while that may be the case, there **still** are **large stocks of fairly accessible fossil fuels**. Examples include **open-pit mines for coal**,12 **or some Saudi oil fields**. Both would be **accessible** and transportable **with limited technology. While the pessimistic fossil fuel argument should carry weight, it does not completely rule out the prospects for a technical recovery.** The situation with metals and minerals is similar to that for fossil fuels. There are suggestions that humanity is running out of various metals such as cryolite, phosphorus, or "rare earths" (such as europium, indium, rhenium, tellurium, terbium, dysprosium, and neodymium) (Alonso et al., 2012). Mining opera- tions have become more complex, extending to remote areas including the sea floor and the far Arctic. However, while it may be more costly to access them from mining, there would be abundant supplies of humanity's physical capital or waste that could be recycled and redeployed. Moreover, many of the most commonly used metals such as copper, iron, lead, or manganese do not face the constraints of rare earths. The initial stages of recovery could be more dependent on commonly accessible metals and minerals, and rarer metals and minerals could become constraints later in recovery, when humanity's extractive capabilities would be larger.

1. There's still time to solve for climate change

World **M**eteorological **O**rganization, 20**25**-01-10, "WMO confirms 2024 as warmest year on record at about 1.55°C above pre-industrial level," https://wmo.int/news/media-centre/wmo-confirms-2024-warmest-year-record-about-155degc-above-pre-industrial-level, Date Accessed: 2025-03-03T17:41:54.192Z //RX

"Today's assessment from the World Meteorological Organization (WMO) proves yet again – global heating is a cold, hard fact," said UN Secretary-General Antóno Guterres. "**Individual years pushing past the 1.5 degree limit do not mean the long-term goal is shot.** It means we need to fight even harder to get on track. Blazing temperatures in 2024 require trail-blazing climate action in 2025," he said. "**There's still time to avoid the worst of climate catastrophe.** But leaders must act – now," he said. The WMO provides a temperature assessment based on multiple sources of data to support international climate monitoring and to provide authoritative information for the UN Climate Change negotiating process. The datasets are from the European Center for Medium Range Weather Forecasts (ECMWF), Japan Meteorological Agency, NASA, the US National Oceanic and Atmospheric Administration (NOAA), the UK's Met Office in collaboration with the Climatic Research Unit at the University of East Anglia (HadCRUT), and Berkeley Earth. "Climate history is playing out before our eyes. We've had not just one or two record-breaking years, but a full ten-year series. This has been accompanied by devastating and extreme weather, rising sea levels and melting ice, all powered by record-breaking greenhouse gas levels due to human activities," said WMO Secretary-General Celeste Saulo. "It is important to emphasize that a single year of more than 1.5°C for a year does NOT mean that we have failed to meet Paris Agreement long-term temperature goals, which are measured over decades rather than an individual year. However, it is essential to recognize that every fraction of a degree of warming matters. Whether it is at a level below or above 1.5°C of warming, every additional increment of global warming increases the impacts on our lives, economies and our planet," said Celeste Saulo. **There is a margin of uncertainty in all temperature assessments.** All six datasets place 2024 as the warmest year on record and all highlight the recent rate of warming. But not all show the temperature anomaly above 1.5 °C due to differing methodologies. The timing of the release of the six temperature datasets was coordinated across the institutions in order to underline the exceptional conditions experienced during 2024. A separate study published in Advances in Atmospheric Sciences found that ocean warming in 2024 played a key role in the record high temperatures. The ocean is the warmest it has ever been as recorded by humans, not only at the surface but also for the upper 2000 meters, according to the study led by Prof. Lijing Cheng with the Institute of Atmospheric Physics at the Chinese Academy of Sciences. It involved a team of 54 scientists from seven countries and 31 institutes. About 90% of the excess heat from global warming is stored in the ocean, making ocean heat content a critical indicator of climate change. From 2023 to 2024, the global upper 2000 m ocean heat content increase is 16 zettajoules (1021 Joules), about 140 times the world's total electricity generation in 2023, according to the study, which is based on the Insitute of Atmospheric Physics dataset. WMO will provide full details of key climate change indicators, including greenhouse gases, surface temperatures, ocean heat, sea level rise, glacier retreat and sea ice extent, in its State of the Global Climate 2024 report to be issued in March 2025. This will also give details of high-impact events.

A2 AI Attacks of Humans

No impact to AI --- not existential and they won't attack humans

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Michael **Shermer 17**. Publisher of Skeptic magazine, a monthly columnist for Scientific American, and a Presidential Fellow at Chapman University. 04/2017. "Why Artificial Intelligence Is Not an Existential Threat." Skeptic, vol. 22, no. 2, pp. 29–35.

Why AI is not an Existential Threat First, most AI doomsday prophecies are grounded in the **false analogy** between **human nature** and **computer nature**, or natural intelligence and artificial intelligence. We are thinking machines, but natural selection also designed into us **emotions** to **shortcut** the **thinking** process because natural intelligences are limited in speed and capacity by the number of neurons that can be crammed into a skull that has to pass through a pelvic opening at birth, whereas artificial intelligence need not be so restricted. We don't need to compute the caloric value of foods, for example, we just feel hungry. We don't need to calculate the waist-to-hip ratio of women or the shoulder-to-waist ratio of men in our quest for genetically healthy potential mates; we just feel attracted to someone and mate with them. We don't need to work out the genetic cost of raising someone else's offspring if our mate is unfaithful; we just feel jealous. We don't need to figure the damage of an unfair or non-reciprocal exchange with someone else; we just feel injustice and desire revenge. Emotions are **proxies** for getting us to act in ways that lead to an increase in reproductive success, particularly in response to threats faced by our Paleolithic ancestors. Anger leads us to strike out, fight back, and defend ourselves against danger. Fear causes us to pull back, retreat, and escape from risks. Disgust directs us to push out, eject, and expel that which is bad for us. Computing the odds of danger in any given situation takes too long. We need to **react instantly**. Emotions shortcut the information processing power needed by brains that would otherwise become bogged down with all the computations necessary for survival. Their purpose, in an ultimate causal sense, is to drive behaviors toward goals selected by evolution to **enhance survival** and reproduction. **AIs** -- even AGIs and ASIs -- will have **no need** of such emotions and so there would be no reason to program them in unless, say, terrorists chose to do so for their own evil purposes. But that's a human nature problem, not a computer nature issue. To believe that an ASI would be **"evil"** in any emotional sense is to assume a computer cognition that includes such psychological traits as **acquisitiveness**, competitiveness, vengeance, and bellicosity, which seem to be projections coming from the mostly **male writers** who **concoct** such **dystopias**, not features any **programmer** would **bother including**, assuming that it **could even be done**. What would it mean to program an emotion into a computer? When IBM's Deep Blue defeated chess master Garry Kasparov in 1997, did it feel **triumphant**, vengeful, or bellicose? **Of course not**. It **wasn't even "aware"** -- in the human sense of self-conscious knowledge -- that it was **playing chess**, much less feeling nervous about possibly losing to the reigning world champion (which it did in the first tournament played in 1996). In fact, toward the end of the first game of the second tournament, on the 44th move, Deep Blue made a legal but incomprehensible move of pushing its rook all the way to the last row of the opposition side. It accomplished nothing offensively or defensively, leading Kasparov to puzzle over it out of concern that he was missing something in the computer's strategy. It turned out to be an error in Deep Blue's programming that led to this fail-safe default move. It was a bug that Kasparov mistook as a feature, and as a result some chess experts contend it led him to be less confident in his strategizing and to second-guess his responses in the subsequent games. It even led him to suspect foul play and human intervention behind Deep Blue, and this paranoia ultimately cost him the tournamentt.[13] Computers don't get paranoid, the HAL 9000 computer in 2001 notwithstanding. Or consider **Watson**, the IBM computer built by David Ferrucci and his team of IBM research scientists tasked with designing an AI that could rival human champions at the game of Jeopardy! This was a far more formidable challenge than Deep Blue faced because of the prerequisite to understand language and the often multiple meanings of words, not to mention needing an