# 1AC

## 1AC---Resilience

#### Contention one is Resilience.

#### There are two scenarios:

#### 1] Climate Change

#### Climate change is worsening – best, most recent studies confirm we’re on the brink of irreversibility and the next 20 years are key.

Martina Igini, 02-11-2025, "Breaching 1.5C Threshold Could Come 'Earlier Than Expected'", Earth.Org, <https://earth.org/paris-agreements-1-5c-threshold-breach-could-come-earlier-than-expected-scientists-warn/> [Martina holds two BA degrees - in Translation Studies and Journalism - and an MA in International Development from the University of Vienna.] DOA: 3/10/2025 //RRM

Two new studies indicate that we might have already crossed a key threshold to limit global warming in line with the Paris Agreement, after 2024 became the first calendar year where global temperatures surpassed 1.5C. — The planet might be on track to breach a key global warming threshold “earlier than expected,” two new papers warned on Monday. The studies, published in Nature Climate Change, follow the hottest year on record and the first in which global temperatures reached 1.5C for the entire year. This has left scientists wondering what this means for warming trends, as it puts us closer to a temperature limit we have pledged to do everything we can to avoid crossing. EO Movement Become an EO Member today and join a growing movement of people determined to make a change. JOIN EARTH.ORG Whether the planet has breached the Paris Agreement 1.5C warming target or not is measured over a 20-year retrospective average, meaning last year does not signal a permanent breach. What the new studies investigated, however, is whether we have already entered the 20-year period above 1.5C. Both concluded we have. One study, authored by Alex Cannon, a research scientist with Environment and Climate Change Canada, concluded that if 1.5C anomalies continue beyond 18 months, “breaching the Paris Agreement threshold is virtually certain.” Meanwhile, Emanuele Bevacqua, a climate scientist at the Helmholtz Centre for Environmental Research in Germany, and colleagues put the odds of 2024 being the first year of a 20-year period reaching the 1.5C warming level at “likely” to “virtually certain.” The Paris deal was drafted in 2015 to strengthen the global response to the growing threat of climate change. It set out a framework for limiting global warming to below 1.5C or “well below 2C” above pre-industrial levels by the end of the century. Beyond this limit, experts warn that critical tipping points will be breached, leading to devastating and potentially irreversible consequences for several vital Earth systems that sustain a hospitable planet. The United Nations had already estimated that current emissions reduction pledges put the planet on track for a temperature increase of 2.6-3.1C over the course of this century. The only way to avoid this is do drastically reduce greenhouse gas emissions, the primary driver of global warming as they trap heat in the atmosphere, raising Earth’s surface temperature. Scientists are not optimistic either. A survey of 380 IPCC scientists conducted by the Guardian last May revealed that 77% of them believe humanity is headed for at least 2.5C of warming. And on Monday, renowned climatologist James Hansen said even the 2C target “is dead” after his latest paper concluded that Earth’s climate is more sensitive to rising greenhouse gas emissions than previously thought. The former top NASA climate scientist famously announced to the US Congress in 1988 that global warming was underway.⁣ Warming Continues Hopes that the recent warming trend would subside with the arrival of a cooling weather pattern known as La Niña were dashed last month, as January turned out to be the hottest January ever recorded. Surface air temperature anomaly for January 2025 relative to the January average for the period 1991-2020. Data source: ERA5. Surface air temperature anomaly for January 2025 relative to the January average for the period 1991-2020. Image: C3S/ECMWF. “[M]any of us expect that 2025 will be cooler than both 2023 and 2024, and is unlikely to be the warmest year in the instrumental record,” climatologist Zeke Hausfather wrote in a blog post on Monday. Their expectations were not met, he went on to say, describing how last beat the prior record set in January 2024 “by a sizable margin.” “January 2025 stands out as anomalous even by the standards of the last two years,” Hausfather wrote. “[A]t least at the start of the year nature seems not to be following our expectations.”

#### Climate change causes extinction---multiple internal links and no adaptability.

Dr. Yew-Kwang **Ng 19** [Winsemius Professor of Economics at Nanyang Technological University, Fellow of the Academy of Social Sciences in Australia and Member of Advisory Board at the Global Priorities Institute at Oxford University, PhD in Economics from Sydney University, “Keynote: Global Extinction and Animal Welfare: Two Priorities for Effective Altruism”, Global Policy, Volume 10, Number 2, May 2019, pp. 258–266, https://onlinelibrary.wiley.com/doi/10.1111/1758-5899.12647] Accessed 10/09/2024, DSL

Catastrophic **climate change** Though by no means certain, CCC causing **global extinction** is **possible** due to **interrelated factors** of **non-linearity**, **cascading effects**, **positive feedbacks**, **multiplicative factors**, **critical thresholds** and **tipping points** (e.g. Barnosky and Hadly, 2016; Belaia et al., 2017; Buldyrev et al., 2010; Grainger, 2017; Hansen and Sato, 2012; IPCC 2014; Kareiva and Carranza, 2018; Osmond and Klausmeier, 2017; Rothman, 2017; Schuur et al., 2015; Sims and Finnoff, 2016; Van Aalst, 2006).7 A possibly **imminent** tipping point could be in the form of ‘an **abrupt ice sheet collapse** [that] could cause a **rapid sea level rise’** (Baum et al., 2011, p. 399). There are **many avenues** for **positive feedback** in global warming, including: • the replacement of an **ice sea** by a **liquid ocean surface** from **melting** reduces the **reflection** and increases the **absorption of sunlight**, leading to faster warming; • the **drying of forests** from warming increases **forest fires** and the release of more **carbon**; and • higher **ocean** **temperatures** may lead to the **release of methane** trapped under the ocean floor, producing **runaway** global warming. Though there are also avenues for **negative** feedback, the **scientific consensus** is for an **overall net positive feedback** (Roe and Baker, 2007). Thus, the Global Challenges Foundation (2017, p. 25) concludes, ‘The world is currently **completely unprepared** to envisage, and even less **deal with**, the consequences of **CCC’**. The threat of sea-level rising from global warming is well known, but there are also other likely and more imminent threats to the survivability of mankind and other living things. For example, Sherwood and Huber (2010) emphasize the **adaptability limit** to climate change due to **heat stress** from high environmental wet-bulb temperature. They show that ‘even **modest** global **warming** could ... expose large fractions of the [world] population to **unprecedented heat stress’** p. 9552 and that with substantial global warming, ‘the area of land rendered **uninhabitable by heat stress** would **dwarf** that affected by rising **sea level’** p. 9555, making **extinction much more likely** and the relatively moderate damages estimated by most integrated assessment models unreliably low. While **imminent** extinction is very unlikely and may not come for a long time even under business as usual, the main point is that we **cannot rule it out**. Annan and Hargreaves (2011, pp. 434–435) may be right that there is ‘an upper 95 per cent probability limit for S [temperature increase] ... to lie close to 4°C, and certainly well below 6°C’. However, probabilities of 5 per cent, 0.5 per cent, 0.05 per cent or even 0.005 per cent of excessive warming and the resulting extinction probabilities cannot be ruled out and are unacceptable. Even if there is only a **1 per cent probability** that there is a time **bomb in the** air**plane**, you **probably want to change your flight**. **Extinction of the whole world is more important to avoid by literally a trillion times**.

#### 2] The economy---recession is coming by next year---Trump guarantees it.

Stephen S. Roach, 3-26-2025, "America has been an engine of global growth. Now it’s a source of stagflation.", MarketWatch, <https://www.marketwatch.com/story/america-has-been-an-engine-of-global-growth-now-its-a-source-of-stagflation-21bfd389> [Stephen S. Roach, former chairman of Morgan Stanley Asia and once the firm's chief economist, is a senior fellow at Yale University's Jackson Institute of Global Affairs and a senior lecturer at Yale's School of Management. He is the author of the new book "Unbalanced: The Codependency of America and China."] DOA: 3/27/2025 //RRM

The world’s major growth engines are about to run in reverse. The policies and uncertainties of President Donald Trump’s second administration have hit a sluggish global economy with a transformational exogenous shock. Risks are especially worrisome in both the U.S. and China, which have collectively accounted for a little more than 40% of cumulative global GDP growth since 2010. America is now the problem, not the solution. Long the anchor of the rules-based international order, the U.S. has turned protectionist, posing major risks to an already fragile global trade cycle. At the same time, Trump’s “Make America Great Again” movement has driven a powerful wedge between the U.S. and Europe and divided North America, with Canada’s very independence in Trump’s crosshairs. The central role of the U.S. in sustaining post-World War II geostrategic stability has been shattered. The U.S. will be unable to put the genie back in the bottle. Trump’s shocking actions have eroded the trust that has underpinned America’s global leadership, and the damage will be evident long after Trump has left the scene. With America having once abdicated its moral authority as the anchor of the free world, who is to say it can’t happen again? This breakdown in trust will cast a long and lasting shadow over economic performance, not least in the U.S. itself, where it is already affecting business decision-making, especially the costly long-term commitments associated with hiring and capital spending. Businesses need to scale their future operations relative to confident expectations of growth trajectories — now an increasingly uncertain proposition. Asset values and consumer confidence, too, have been shaken. Uncertainty, the enemy of decision-making, is likely to freeze the most dynamic segments of the U.S. economy. Trade wars have no winners The Trump shock is likely not only to exacerbate the Sino-American conflict but also to weaken both countries’ growth prospects significantly. For China, state-directed policy guidance might temper the initial blow of a Trump policy shock. But the pressures of Trump’s tariff escalation will undermine China’s export-led growth model, which is especially problematic for economic growth, given the lingering weakness of China’s domestic demand. The country’s long-promised consumer-led rebalancing of the economy remains more of a slogan than an actual shift in the sources of Chinese growth — especially with a deficient social safety net that continues to encourage fear-driven precautionary saving. China’s just-announced 30-point action plan to boost household demand draws much-needed attention to the seemingly chronic plight of the Chinese consumer. But it offers only modest support to an inadequate social safety net. The Trump shock is likely not only to exacerbate the Sino-American conflict but also to weaken both countries’ growth prospects significantly. Don’t count on other economies filling this void. Eventually, India might be able to take up some of the slack. But its relatively small share of world GDP — currently 8.5% (in purchasing-power-parity terms), compared with 34% for China and the U.S. combined — means that that day is in the distant future. The same is true of Europe. While the European Union’s 14% share of world GDP is nearly double that of India, Europe remains saddled with anemic growth, compounded by mounting trade pressures associated with an escalating global tariff war. If the apparent breakdown of the trans-Atlantic alliance has a silver lining, it is that the incentives for strategic cohesion should have an outsize impact on European military spending. But that will also take time. Meanwhile, Europe will be exposed equally to the adverse effects on business and consumer expectations and decision-making, comparable to those afflicting the U.S. Downside risks will progressively build. What does all this mean for global economic prospects in the coming years? The current baseline expectation of around 3.3% world GDP growth for 2025-26, as per recent forecasts by the International Monetary Fund, is far too sanguine. While there may be some front-loading of growth momentum in the early part of this year — exemplified by accelerated shipments of Chinese exports ahead of Trump’s tariff hikes — I suspect that the downside risks will progressively build. Don't miss out on this limited time offer! Don't fall behind this tax season. Subscribe to learn how today’s business practices, news, and tax policies impact the market and your money. Subscribe Now MarketWatch on Multiple devices That points to a fractional reduction of forecasts for global economic growth for 2025, with the slowdown becoming considerably more pronounced in 2026 and after. That could easily push an increasingly fragile world economy down to the 2.5% growth threshold, typically associated with outright global recession. Nor is this likely to be a standard shortfall of global growth. To the extent that the tariff war is aimed at promoting friendshoring and strengthening supply-chain resilience, the global economy’s supply side is likely to come under significant strain. A new layer of adjustment costs is being imposed on a once-globalized world. Reshoring to higher-cost local producers not only takes considerable time, but also erodes the efficiencies of production, assembly and delivery that have underpinned worldwide disinflation over the past three decades. Almost five years ago, in the depths of the COVID-19 shock, I warned that the onset of stagflation was only “a broken supply chain away.” Subsequent experience and research have borne that out, confirming that the supply-chain disruptions during the pandemic and its immediate aftermath generated significant upward pressure on prices. A global trade conflict implies a similar dynamic. The higher costs associated with Trump’s coming “reciprocal” escalation of multilateral tariffs, which are due to be announced on April 2, are especially problematic. In the face of a likely shortfall of economic growth, the added cost and price pressures are likely to tip the scales toward global stagflation. The Trump shock is the functional equivalent of a full-blown crisis. The Trump shock, in short, is the functional equivalent of a full-blown crisis. It is likely to have a lasting impact on the U.S. and Chinese economies, and the contagion is almost certain to spread throughout the world through cross-border trade and capital flows. Perhaps most importantly, this is a geostrategic crisis, reflecting a reversal of America’s global leadership role. In the space of little more than two months, Trump has turned the world inside out. If my assessment of this shock is anywhere close to the mark, concerns over the global economic forecast seem almost trivial.

#### It would cause widespread poverty.

Heidi Shierholz, 9-10-2009, "New 2008 poverty, income data reveal only tip of the recession iceberg", Economic Policy Institute, <https://www.epi.org/publication/income_picture_20090910/> [Heidi Shierholz (she/her) is the president of the Economic Policy Institute, a nonprofit, nonpartisan think tank that uses the power of its research on economic trends and on the impact of economic policies to advance reforms that serve working people, deliver racial justice, and guarantee gender equity. In 2021 she became the fourth president EPI has had since its founding in 1986.] DOA: 4/4/2025

The poverty rate increased from 12.5% to 13.2% between 2007 and 2008, representing an additional 2.6 million people living in poverty. The large increase in poverty suggests that as anti-poverty policies have come to depend more on paid work as the main pathway out of poverty, the safety net has become less effective in reducing economic hardship when the economy and job market are underperforming.

• The poverty rate for children was 19.0% in 2008, representing 14.1 million kids living in poverty. In 2008, over one-third (35.3%) of all people living in poverty were children.

• It is important to note that the federal poverty threshold as currently measured is widely understood by poverty researchers to be an inadequate measure of the income needed to make ends meet. Poverty experts often use twice the poverty line as a more accurate threshold for material deprivation. In 2008, 31.9% (96 million people) were living below twice the poverty threshold, up from 30.5% in 2007. The number was even higher for children, with 40.6% of children (30.1 million) living below “twice poverty,” up from 39.2% in 2007.

• Hispanics and Asians were particularly hard-hit by increases in poverty in 2008, increasing by 1.6 and 1.4 percentage points, respectively, from 2007 to 2008.

• In 2008, over one-third (33.9%) of all black children and nearly one-third (30.6%) of all Hispanic children were living in poverty (increases of 0.2 and 2.0 percentage points, respectively, since 2007).

#### Affirming solves both - public action creates certainty to ensure private sector investment in nuclear energy.

IEA, 1-16-2025, "A new era for nuclear energy beckons as projects, policies and investments increase", <https://www.iea.org/news/a-new-era-for-nuclear-energy-beckons-as-projects-policies-and-investments-increase> [The International Energy Agency was created in 1974 to help co-ordinate a collective response to major disruptions in the supply of oil. While oil security remains a key aspect of our work, the IEA has evolved and expanded significantly since its foundation. Taking an all-fuels, all-technology approach, the IEA recommends policies that enhance the reliability, affordability and sustainability of energy. It examines the full spectrum issues including renewables, oil, gas and coal supply and demand, energy efficiency, clean energy technologies, electricity systems and markets, access to energy, demand-side management, and much more. Since 2015, the IEA has opened its doors to major emerging countries to expand its global impact, and deepen cooperation in energy security, data and statistics, energy policy analysis, energy efficiency, and the growing use of clean energy technologies.] DOA: 3/10/2025 //RRM

Most of the existing nuclear power fleet today is in advanced economies, but many of those plants were built decades ago. Meanwhile, the global map for nuclear is changing, with the majority of projects under construction in China, which is on course to overtake both the United States and Europe in installed nuclear capacity by 2030. Russia is also a major player in the nuclear technology landscape. Of the 52 reactors that have started construction worldwide since 2017, 25 are of Chinese design and another 23 are of Russian design. Similarly, the report shows how the production and enrichment of uranium, the fuel that goes into nuclear reactors, are highly concentrated. “Today, more than 99% of the enrichment capacity takes place in four supplier countries, with Russia accounting for 40% of global capacity, the single largest share,” Dr Birol said. “Highly concentrated markets for nuclear technologies, as well as for uranium production and enrichment, represent a risk factor for the future and underscore the need for greater diversity in supply chains.” Innovations in nuclear technologies are helping to drive momentum behind new projects, the report finds. SMRs, a type of smaller scale nuclear power plants that are quicker to build with greater scope for cost reductions, are drawing increasing interest from the private sector. The report highlights how the introduction of SMRs could lead to lower financing costs. With the right support, SMR installations could reach 80 GW by 2040, accounting for 10% of overall nuclear capacity globally. However, the success of the technology and speed of adoption will hinge on the industry’s ability to bring down costs by 2040 to a similar level to those of large-scale hydropower and offshore wind projects. A new era for nuclear energy will require a lot of investment. In a rapid growth scenario for nuclear, annual investment would need to double to USD 120 billion already by 2030. Given the scale of the infrastructure investment required, the rollout of new nuclear projects cannot rely exclusively on public finances. IEA analysis shows that ensuring the predictability of future cash flows is key to bringing down financing costs and attracting private capital to the nuclear sector. The report highlights that the private sector is increasingly viewing nuclear energy as an investible energy source with the promise of firm, competitive, clean power that can serve energy-intensive operations 24/7. Notably, big names in the technology sector are signing power purchase agreements with developers to provide electricity for data centres and artificial intelligence. To take advantage of the opportunities that nuclear power offers, governments must be prepared to provide the strategic vision alongside stable regulatory frameworks that will give the private sector confidence to invest. The report details how incentives and public finance more broadly can unlock the investment needed to deliver greater clean and reliable power from nuclear.

#### Domestic action facilitates international projects and energy exports.

Maria Lorenzini, 3-7-2025, "The US can reduce Russia's nuclear energy—and geopolitical—influence", Atlantic Council, <https://www.atlanticcouncil.org/blogs/energysource/the-us-can-reduce-russias-nuclear-energy-and-geopolitical-influence/> [Marina Lorenzini is the research program coordinator at the Middle East Initiative at the Belfer Center for Science and International Affairs at Harvard University’s John F. Kennedy School of Government.] DOA: 3/10/2025 //RRM

In early February, the Bulgarian energy minister met with officials from the US Export-Import Bank (EXIM) to advance a $8.6 billion (more than 60 percent of the estimated cost) letter of interest for the two new reactors. For the remaining amount, the Bulgarian treasury or Kozloduy’s owner has several options. Bulgaria may also have access to debt or equity financing from the world’s largest multilateral development lender, the European Investment Bank. Additionally, as the World Bank considers how to incorporate nuclear power into their offerings, any steps toward engagement would encourage other lenders to do the same. If further capital is required, Bulgaria—with its relatively healthy domestic economy—could issue dollar-denominated bonds to raise funds, or the Kozloduy owner could issue green bonds similar to Canada’s Bruce Power. Bulgaria’s ability—and that of any potential lenders—to overcome financing hurdles will determine the success of such agreements. But if the agreement leads to new nuclear power generation, it bodes well for similar economies to undertake new reactor builds. Soviet reactor reaches end of life in Armenia Russia dominates Armenia’s energy system, but Armenian foreign policy has shifted dramatically away from Moscow in the past year, in part due to the lack of Russian military assistance to Armenia when Azerbaijan seized Nagorno-Karabakh. The policy change will not immediately impact Armenia’s Soviet-era VVER-440 nuclear reactor at Metsamor, which has received several upgrades and lifetime extensions—the latest, with Rosatom’s support, will sustain the remaining operational reactor until 2036. However, preparations must be made in the coming years to: extend the operational lifetime (a highly unlikely outcome due to the reactor’s age); build new light-water reactors (whether from China, Russia, South Korea, or the United States); or invest in small modular reactors (SMRs). Armenia may seek to build an SMR rather than a traditional reactor due to limited financing options and low power consumption. To build a new reactor, Armenia might want to follow Romania’s blended model for financing its SMR deal with NuScale. The EXIM and US International Development Finance Corporation offered Romania tentative financial support totaling $4 billion. Public and private partners then formed a coalition of stakeholders from Japan, South Korea, the United Arab Emirates, and the United States to finance the SMR project up to $275 million. If further capital is needed, private financial institutions have also recently announced their plans to support the nuclear industry. Whether and when construction begins for the reactor in Romania will demonstrate feasibility, but so far, the financial structure has shown promise. A great nuclear power balance In partnership with allies, the United States should advance financial and commercial solutions to help countries dependent on Russian nuclear energy diversify their domestic power programs. The United States is well positioned to do so. Trump, and Biden before him, have supported nuclear energy domestically, which, in turn, can result in the export of US technologies and expertise. Strong bipartisan appropriations from multiple administrations will reinforce Trump’s vision and the domestic nuclear energy industry. In 2019, during Trump’s first administration, the Nuclear Energy Innovation and Modernization Act became law, paving the way for a streamlined advanced reactor licensing process. Under the Biden administration, the multibillion-dollar appropriations from the Infrastructure Investment and Jobs Act and the Inflation Reduction Act bolstered the US nuclear energy industry. Further, the 2023 Nuclear Fuel Security Act and the 2024 ADVANCE Act enjoyed bipartisan support on Capitol Hill. Building on these domestic advances, Trump’s embrace of financial vehicles, such as the EXIM Bank or DFC, that bridge public and private sectors, will facilitate investments in multi-billion dollar infrastructure projects outside of the United States and bolster US energy-related exports, including from its domestic nuclear energy industry. These factors bode well for the United States to substantially weaken Russia’s share of global nuclear markets and its geopolitical influence.

#### Nuclear energy is key to climate solvency and is better than alternatives – it also fosters economic resilience.

WNA, 05-01-2024, "Nuclear Energy and Sustainable Development", World Nuclear Association, <https://world-nuclear.org/information-library/energy-and-the-environment/nuclear-energy-and-sustainable-development> [World Nuclear Association’s mission is to facilitate the growth of the nuclear sector by connecting players across the value chain, representing the industry’s position in key world forums, and providing authoritative information and influencing key audiences.] DOA: 3/14/2025 //RRM

* spikes climate turns

The relationship between energy consumption and human development is clear. Up to about 100 GJ per capita consumption – a level yet to be reached by 80% of the world’s population – a country can fundamentally enhance the health, educational standards, and general wellbeing of its population by consuming more energy. Any transition towards a more equitable and sustainable future must therefore be predicated on delivering the benefits of access to modern, affordable and reliable energy services to all. But doing so will increase overall energy demand: at present, the world’s poorest 4 billion people consume just 5% of the amount of energy enjoyed by those living in developed economies. For that figure to rise to 15%, global energy consumption would increase by the equivalent of an additional United States’ worth of demand. The key question, therefore, is: how should that energy be supplied? At present, over 80% of primary energy consumption is from the burning of oil, gas and coal – unchanged since 1990. However, unregulated emissions from the combustion of fuels are causing climate change, environmental damage, and the premature death of an estimated 7 million people each year. The continued use of fossil fuels therefore has profound intra- and intergenerational social, economic and environmental implications. The resulting dual challenge – the need to reduce harmful emissions, whilst providing more energy to more people – positions the energy sector at the heart of achieving sustainable development. There is no technology that is fully without risk to people or the environment. For example, whilst low-carbon sources of energy do not emit carbon dioxide at the point of use, they are responsible for emissions and waste during construction, manufacturing and decommissioning. As such, any energy technology’s compatibility with sustainable development objectives must be assessed in relative terms – in the light of the alternatives. As the only proven, scalable and reliable low-carbon source of energy, nuclear power will be required to play a pivotal role if the world is to reduce its reliance on fossil fuels to address climate change and chronic air pollution. More broadly, however, the proposition of nuclear power as a sustainable energy source is fundamentally robust due to its innate energy density, and its internalization of health and environmental costs. Using nuclear energy has numerous sustainability advantages relative to alternative forms of generation. By expanding its use, modern and affordable energy can be provided to all who currently lack access, whilst reducing the human impact on the natural environment, and ensuring that the world’s ability to meet its other sustainable development goals is not curtailed. Defining Sustainable Development A number of definitions have been put forward for sustainable development, but the most widely quoted is from the 1987 Brundtland Report1: "Sustainable development is development that meets the needs of the present, without compromising the ability of future generations to meet their own needs” Sustainable development is therefore the pathway to sustainability. For an activity, product or entity to be truly sustainable, it must achieve environmental, economic and social sustainability in balance: the three 'pillars'. The three pillars of sustainability Figure 1: The three 'pillars' of sustainability In 2015, the 193 member states of the United Nations (UN) adopted the 2030 Agenda for Sustainable Development – a plan of action for people, planet and prosperity, aligned to the three pillars of sustainability. To disaggregate the bold ambitions of the 2030 Agenda, the UN agreed 17 Sustainable Development Goals (SDGs) to be used to guide and gauge progress. The United Nations 17 sustainable development goals Figure 2: The UN's Sustainable Development Goals More energy, lower emissions The 2030 Agenda for Sustainable Development recognized that by nature, the SDGs are “integrated and indivisible”. As such, achieving progress across any of the SDGs is contingent upon progress across the others. However the centrality of energy – and thus SDG 7 – is widely recognized: progress across all SDGs is contingent upon the provision of a sustainable supply of energy. Providing access to affordable, reliable and clean energy is pivotal for eradicating poverty, for improving population’s health and education, and for reducing greenhouse gases whilst continuing to support industrial development (see Figure 4). The link between the wellbeing of a population and energy consumption is well-established for developing countries. For those countries with an annual energy consumption below 100 GJ per capita – a level that 80% of the world’s population is yet to reach2, 3 – there is a clear correlation between their energy consumption and Human Development Index (HDI)a value, which is an indicator of a nation's health, education and living standards. Human Development Index and annual energy consumption per capita Figure 3: Human Development Index and annual energy consumption per capita, 2020 (source: BP) This relationship between human wellbeing and energy consumption explains the importance assigned to ensuring reliable access to affordable energy for all in SDG 7; reducing the share of the world’s population whose prospects are curtailed by lack of energy is essential for meeting the needs of the present. Achieving progress towards SDG 7 for the world’s growing population will require a significant increase in energy provision. The importance of clean energy for a sustainable future Figure 4: SDG 7 – key to all SDGs The key question, therefore, is how best to supply those growing energy needs. Our existing energy system is built on fossil fuels, but their combustion for energy generates carbon dioxide (CO2) emissions, a key contributor to climate change. The energy sector is responsible for about three-quarters of all greenhouse gas emissions, and as such, fundamentally transforming it is the single most important step towards combatting climate change. The UN has long-recognized climate change as the defining issue of our time. Despite this explicit acknowledgement, and spectacular recent investment in renewable energy, the world burned 66% more fossil fuels for energy in absolute terms in 2021 than it did in 1990. As a result, global energy-related CO2 emissions were 63% higher. Box 1: The importance of electricity At present, fossil fuels are used to meet our energy requirements for transport, residential applications (e.g. heating), and to power industrial processes. Fossil fuels are also the dominant means of generating electricity, but other sources, including hydro, nuclear, solar and wind, are used too. To transition to a sustainable energy system all energy sectors will need to be decarbonized. However, much of the focus to date has been on the electricity sector for several reasons: The electricity sector is the most readily-decarbonized, as it provides the means to use non-fossil low-carbon energy (e.g. hydro, nuclear, wind and solar). Electricity is clean at the point of final use. This has two main advantages: improving air quality in urban areas; and centralising energy-related emissions (i.e. at power stations), making emissions regulation more straightforward. About 20% of final energy consumption is in the form of electricity, but the generation of electricity is responsible for almost 50% of all energy-related emissions. Despite the focus on electricity, limited progress has been made to date. In 2021, worldwide, 133% more electricity was generated from fossil fuels than 30 years earlier. Can nuclear contribute to sustainable development goals? Despite the crucial role that nuclear will need to play if the UN’s SDGs are to be achieved, there remains some opposition to the growing recognition of the energy source’s credentials for contributing towards sustainable development. Fundamentally, nuclear energy’s competitive position from a sustainable development perspective is robust due to its energy density and internalization of health and environmental costs. Using nuclear energy brings multiple sustainability advantages over available alternatives, explaining its expanded role in almost all major studies that outline plausible pathways towards sustainable energy provision (see Box 2). An analysis of nuclear energy’s characteristics within a sustainable development framework shows that the approach adopted within the nuclear energy sector is consistent with a central goal of sustainable development of passing a range of assets to future generations while minimising environmental impacts and burdens. Box 2: Nuclear energy’s role in sustainable energy transitions Predicting the future of energy supply is complex, and uncertainties are high. However, it is striking that in almost all forward-looking normative scenarios, nuclear energy’s share in the mix grows substantially4. Generally, the more ambitious a scenario is in its aims for decarbonization and sustainability, the greater the role for nuclear. In the IPCC’s P3 'middle-of-the-road' scenario, for example, nuclear generation grows six-fold by 2050. Primary energy mix by 2040 and share of nuclear energy Primary energy mix by 2040 and share of nuclear energy (source: World Energy Council) The environmental pillar The environmental pillar of sustainable development encompasses issues including air and water pollution, waste management, ecosystem management, and protection of natural resources, wildlife and endangered species. Climate change The United Nations recognizes climate change as “the most systemic threat to humankind”. As such, addressing it is generally considered the most significant and urgent sustainability challenge. Climate change is resulting from increasing concentrations of CO2 in the Earth’s atmosphere. Given that three-quarters of anthropogenic CO2 emissions result from the burning of fossil fuels for energy, the main focus should be on deploying energy technologies that emit only small amounts of CO2 per unit of energy. On a life-cycle basis, nuclear power emits just a few grams of CO2 equivalent per kWh of electricity produced. A median value of 12g CO2 equivalent/kWh has been estimated for nuclear – similar to wind, and lower than all types of solar5. Average life-cycle CO2 equivalent emissions Figure 5: Average life-cycle CO2 equivalent emissions (source: IPCC) Ecosystem protection The main impacts of power production on ecosystems are eutrophication (i.e. increased concentrations of chemical nutrients, primarily nitrogen and phosphorus, that damage water quality by causing oxygen depletion) and acidification (i.e. increased concentrations of acidic chemicals – caused by the absorption of atmospheric CO2 – that damage water quality, harming shellfish and coral, and leading to excessive algal growth). Among power producing technologies, fossil fuels have by far the greatest potential to cause both acidification and eutrophication. CO2 released into the atmosphere during the combustion of fossil fuels dissolves into the oceans, increasing their acidity; and the mining, extraction, transport, waste treatment and emissions associated with fossil fuel use contribute to their high eutrophication potential. By contrast, both the acidification and eutrophication potential of nuclear power are estimated to be among the lowest of all available generation technologies6. Figure 6: Lifecycle eutrophying emissions for 2020, in grams of phosphorus equivalent per MWh (source: Carbon Neutrality in the UNECE Region: Integrated Life-cycle Assessment of Electricity Sources, UNECE (March 2022) Land and water use Land and water usage are key criteria for assessing the sustainability of different power production technologies. The power sector competes for limited resources with other important sectors such as agriculture, industry and housing, and the emergence of a new concept known as the water-food-energy nexus reflects the growing appreciation of the interconnectedness of policy decisions in these three areas. Nuclear power plants produce huge amounts of low-carbon power and require less land to do so than any other energy source. The UN expects two-thirds of people to be living in urban areas by 2050 – an additional 2.5 billion individuals – where land is at a premium. Coupled with the need to preserve land to prevent loss of biodiversity, it is likely that nuclear energy’s unique land-use advantages will prove increasingly determinative in the future. Box 3: The water-food-energy nexus Demand for water, food and energy is increasing, driven by rising global population and prosperity, as well as urbanization, dietary changes and economic growth. More than one-quarter of the world’s energy is used for the production of food, and the agricultural sector is the largest single consumer of freshwater resources. The inextricable link between achieving water, energy and food security has driven recognition that policy decisions on each cannot be made effectively in isolation. The nexus approach is designed to integrate management across the three closely-related sectors. The water-food-energy nexus The water-food-energy nexus (source: International Water Association) A large two-unit nuclear power plant can provide electricity for 4-5 million people from a generating footprint of just 2 square kilometres. However, the land use of all energy-generating technologies extends beyond their generating footprint, and includes the required mining of raw materials and, for conventional sources of power, their fuel cycle. Taking this into account, the land use of biomass, hydro, wind and solar are between one and three orders of magnitude greater than nuclear7. Relative land useof electricity generation options per unit of electricity Figure 7: Relative land use (fuel mining and generating footprint) of electricity generation options per unit of electricity (source: Brook & Bradshaw, 2015) At some stage during supply, construction or operation, all electricity generating options consume water. Wind and solar energy have the smallest water 'footprints', whereas biomass and hydropower have the largest. Fossil fuels and nuclear consume significant quantities of water in the operational phase for cooling8. Fresh water is a valuable resource in most parts of the world. Apart from proximity to main load centres, there is no reason to site nuclear power plants away from a coast, where they can use once-through seawater cooling. The high energy density of uranium means that logistical requirements for fuel are modest (about 200 tonnes for a large reactor annually versus over 3,000,000 tonnes for an equivalent coal plant) allowing for flexible siting of nuclear power plants. In the event that water is so limited that it cannot be used for cooling, and a coastal location is not available, plants can be sited away from the load demand, but this will incur additional transmission costs. Whilst nuclear power plants require significant quantities of water for cooling, their ability to provide large amounts of power is increasingly being used to secure water supplies in areas of scarcity. Where potable water cannot be obtained from streams and aquifers, desalination of seawater, mineralized groundwater or urban waste water is required. Most desalination at present is powered by fossil fuels, but nuclear desalination has been used for many years in countries such as Japan, India and Kazakhstan. Water consumption per unit of electricity and heat produced Figure 8: Water consumption per unit of electricity and heat produced 2008-2012 (source: Mekonnen et al., 2015) Waste The careful management of waste streams is a key sustainability consideration in order to prevent short- or long-term harm to humans and the environment. All energy-producing technologies create waste, but the amount produced, the risk it poses, and the means of management vary widely. The energy density of fuel used for electricity generation is one key determinant of the magnitude and manageability of waste streams. Uranium’s exceptionally high energy density means a relatively small amount of fuel is required per unit of energy produced. Using less fuel reduces the scale of fuel extraction activities and transport requirements – in turn reducing the chance of unintended environmental releases – and results in the creation of less waste. Contrary to popular belief, therefore, one of the benefits of producing electricity from nuclear energy is that its waste streams are small, and therefore innately manageable. It is for this reason that nuclear energy is the only form of electricity generation to fully contain its emissions, effluents and waste. Unlike nuclear energy, some energy sources dispose of wastes to the environment, or have health effects which are not costed into the product. These implicit subsidies, or external costs as they are generally called, are nevertheless real and usually quantifiable, and are borne by society at large. Their quantification is necessary to enable rational choices between energy sources. Nuclear energy provides for waste management, disposal and decommissioning costs in the actual cost of electricity (i.e. it has internalized them), so that external costs are minimized. The social pillar Human health – air pollution Air pollution arising from the use of carbon-based fuels for energy is one of the biggest threats to human welfare. The World Health Organization estimates that about 7 million people die prematurely each year as a result of air pollution exposure. Nuclear power plants emit virtually no air pollutants during operation, and because they are reliable and can be deployed on a large scale, they can directly replace fossil fuel plant. NASA’s Goddard Institute for Space Studies and Columbia University’s Earth Institute estimated that the use of nuclear power prevented over 1.8 million air pollution-related deaths between 1971 and 2009. There are numerous non-power uses of nuclear technology that contribute to fulfilment of human 'needs'. For example: the provision of nuclear medicine; helping to control the spread of infectious diseases; and securing reliable supplies of clean water, sanitation and food (see Figure 9). Examples of the contribution of non-power nuclear technologies to the SDGs Figure 9: Examples of the contribution of non-power nuclear technologies to the SDGs Human health – radiation Radiation is a well-understood process, with natural sources accounting for most of the radiation people receive each year. Doses received average 2.4 mSv/yr, but vary widely by location, driven by factors such as underlying geology and altitude. The highest known level of background radiation affecting a substantial population is in the states of Kerala and Madras in India where some 140,000 people receive doses which average over 15 mSv/yr from gamma radiation, in addition to a similar dose from radon. Comparable levels occur in Brazil and Sudan, with average exposures up to about 40 mSv/yr to many people. Lifetime doses from natural radiation range up to several thousand millisieverts. However, there is no evidence of increased cancers or other health problems arising from these high natural levels. 20 mSv/yr is the current average allowed limit for nuclear industry employees and uranium miners during normal operation. The millions of nuclear workers that have been monitored closely for 50 years have no higher cancer mortality than the general population but have had up to ten times the average dose. Nuclear power is the only technology that systematically measures and accounts for radioactive emissions. However, exposure to above-background radiation is not exclusive to nuclear power-related activities. UNSCEAR has estimated that both occupational and public exposures from electricity generation are higher for workers in the coal industry, for example. Employment Nuclear power plants can operate for over 60 years, creating long-lasting, high-paying jobs for people from a range of fields and educational backgrounds. Undertaking a nuclear power programme therefore represents a long-term investment in human capital. Investment in capital-intensive projects tends to spill over into other industries and economic sectors. A modern gigawatt-scale nuclear power plant employs 500-1000 workers directly. But throughout both its construction and operation, it requires a complex supporting supply chain (e.g. construction, manufacturing and consultancy services), creating attractive indirect and induced employment opportunities. Hinkley point C unit 2 construction site During construction of a large, modern plant, thousands of workers may be onsite. At Hinkley Point C (pictured), over 8000 workers will be onsite during the peak of construction. A study of the European nuclear industry by Deloitte suggested that nuclear provides more jobs per TWh of electricity generated than any other clean energy source. According to the report, the nuclear industry sustains more than 1.1 million jobs in the European Union. In addition, each gigawatt of installed nuclear capacity generates €9.3 billion in annual investments in nuclear and related economic sectors, and provides permanent and local employment to nearly 10,000 people. For every €1 invested, the nuclear industry generates an indirect contribution of €4 in GDP, and every direct job creates 3.2 jobs in the EU as a whole. The economic pillar Resource adequacy, preservation & opportunity cost Uranium has no significant use other than nuclear energy production. Producing electricity with uranium extends the overall resource base available for human use, provides greater diversity of choice and allows the use of other resources, such as hydrocarbons, where they are most effective e.g. for transportation or petrochemicals. Uranium is plentiful and is distributed among a wide range of geopolitically diverse countries. The distribution of uranium reduces the risk of market disruptions of the nature experienced during historical oil and gas crises. Resource efficiency and material throughput The focus on power supply options defined as 'renewable' over the past several decades reflects the importance attached to the preservation of finite resources. Renewable sources of energy are those generated from natural processes that are continuously replenished. Renewable technologies, therefore, are defined as those that are not fuelled by a finite resource. Intergenerational equity is a key principle of sustainable development, and so the purported advantage of renewable energy options – that they do not diminish finite fuel resources for future generations – is valuable. However, fuel supply is just one aspect of the material requirements for power generation. All means of generating electricity require infrastructure that consumes finite resources, with the major material inputs by volume outside of fuel supply typically concrete and metals (e.g. aluminium, cooper, steel). Estimates for the use of key bulk materials and copper per TWh for different technologies have been produced by former environmental organization Bright New World9, based on a literature review of studies on this topic. Nuclear PWR Solar Wind Hydro Gas (load following) Gas (load following) + CCS Coal Coal + CCS Concrete 1060 1220 4470 15,320 390 820 450 520 Steel 130 940 1450 330 320 970 160 1170 Aluminium 0.3 287.5 17.4 8.7 5.7 21.4 1.6 37.4 Copper 2.5 68.0 39.1 4.8 5.4 8.8 3.0 11.8 Capacity f. 85% 28% 35% 50% 30% 30% 85% 85% Lifespan 60 30 30 100 60 60 60 60 Table 1 and Figure 10: Major materials for different generating technologies, tonnes per TWh (source: Bright New World) The aim of reducing material inputs is a central concept of sustainable development. Using material in the production, transport and implementation of power producing technologies will consume energy in the form of fossil fuels, and as such the metric of material throughput is important in consideration of energy efficiency as well as life-cycle carbon emissions. But more broadly, resource efficiency is a key aim in itself. Consumption of primary materials is expected to more than double by 2050. Using nuclear energy to generate electricity is one means by which resource demand can be reduced to more sustainable levels. Affordability Affordability is a key component of SDG 7. The benefits of access to modern energy are profound, but the aspiration of ensuring access for all can only be realized if it is affordable. The relative affordability of electricity supply options is a function of generation costs as well as the costs they impose on the system as a whole. Generation costs are typically reported using the levelized cost of electricity generation (LCOE) metric, which is a measure of the ratio of the total costs of a generic plant (capital and operating), to the total amount of electricity expected to be generated over that plant’s lifetime. LCOE as a metric is relatively simple and transparent, and so is widely referenced. However, its ability to assess overall costs to society are limited. In deregulated markets, revenues are uncertain over a generator’s lifetime making the metric less pertinent; and the metric does not attempt to capture the markedly different system costs of technologies. System costs have always existed, but the growth in variable renewable energy sources has promoted the topic in recent years. System costs include required outlays for distribution and transmission, and most importantly, backup for the inherent variability of some renewable energy. System costs are difficult to assess, as they depend on the characteristics of the system in question, the time frame considered, location and numerous other factors. Whilst there is uncertainty, estimates are consistent in that system costs for variable energy sources are significant, increase non-linearly with growing shares of electricity generation, and are an order of magnitude higher than for dispatchable technologies10. The costs of the system as a whole are ultimately borne by society, and so, given the increasing use of variable renewable energy, it is important that system costs are internalized to ensure that policy decisions can be properly directed towards maximizing affordability. Negative effects beyond the system itself (i.e. negative externalities) related to the provision of electricity are increasingly being recognized as significant and complicate the picture further. Negative externalities related to electricity generation – most notably the emissions of greenhouse gases and other pollutants – represent a social cost that may impact the true affordability of different electricity supply options. It is well documented that the social and economic costs of climate change and air pollution are significant. In order to better-understand the socially optimal level of externalities (relative to production) it is imperative that the relative costs of different supply options include a reasonable estimate of their impacts on emissions and the climate. Nuclear energy is cost-competitive based on a simple LCOE comparison, particularly at low discount rates. Its unique attributes of providing predictable, reliable supply that is low-carbon means that inclusion of system costs and negative externalities both markedly improve the relative affordability of nuclear energy. Grid-level system costs for dispatchable and renewable technologies Figure 11: Grid-level system costs for dispatchable and renewable technologies (source: OECD Nuclear Energy Agency, 2018) Notes & references Notes a. The Human Development Index (HDI) is a United Nations Development Programme statistical tool to measure a country's level of social and economic development. The social and economic dimensions of a country are based on the health of its people, their level of education attainment and their standard of living. A country scores a higher HDI when the lifespan of its people is longer, the education level is higher, and the gross national income per capita is higher. [Back] References 1. United Nations, Report of the World Commission on Environment and Development: Our Common Future ('Brundtland Report') (1987) [Back] 2. United Nations Development Programme, Human Development Reports [Back] 3. BP Energy Outlook: 2019 edition [Back] 4. World Energy Council, World Energy Scenarios 2019, The Future of Nuclear: Diverse Harmonies in the Energy Transition (2019) [Back] 5. Steffen Schlömer (ed.), Technology-specific Cost and Performance Parameters, Annex III of Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (2014) [Back] 6. United Nations Economic Commission for Europe, Carbon Neutrality in the UNECE Region: Integrated Life-cycle Assessment of Electricity Sources (March 2022) [Back] 7. Barry W. Brook and Corey J. A. Bradshaw, Key role for nuclear energy in global biodiversity conservation, Conservation Biology, 29, 3 (2015) [Back] 8. Mesfin Mekonnen et al., The consumptive water footprint of electricity and heat: a global assessment, Environmental Science: Water Research & Technology (March 2015) [Back] 9. Bright New World, Materials use in a clean energy future (June 2021) [Back] 10. OECD Nuclear Energy Agency, The Full Costs of Electricity Provision (2018) [Back]

## 1AC---Nuke Subs

#### Contention two is NUCLEAR SUBMARINES.

#### Chinese tensions are rising due to their slowing economy---they’re leading in the Navy.

Christopher Bodeen 3-5, Correspondent at The Associated Press with a degree from Tufts University, 3-5-2025, "China will increase its defense budget 7.2% this year", AP News, https://apnews.com/article/china-defense-budget-taiwan-4ac7cbdc7d5b889732cd55916ff7eb36, Accessed 3-31-2025, ARC

TAIPEI, Taiwan (AP) — China said Wednesday it will increase its defense **budget 7.2%** this year, as it continues its campaign to build a larger, more modern military to assert its territorial claims and **challenge the U.S. defense lead in Asia**.

China’s military spending remains the second largest behind the U.S. and it already has the **world’s largest navy**.

The budget, which adds up to about $245 billion, was announced at [the National People’s Congress](https://apnews.com/article/china-congress-economy-defense-tariffs-d6192774e13ccb7e28e06d4c3f2173c4), the [annual meeting](https://apnews.com/article/china-congress-legislature-5cf899bfc9d4705135d9dd56c8dc5212) of China’s legislature. The Pentagon and many experts say China’s total spending on defense may be 40% higher or more because of items included under other budgets.

The boost is the same percentage as last year, far below the double-digit percentage increases of previous years and reflecting an overall slowdown in the economy. The nation’s leaders have set a target of around 5% growth for this year.

Tensions with the **U.S.,** **Taiwan**, **Japan** and **neighbors** who have overlapping claims to the crucial South China Sea are seen as driving spending on increasingly [high-tech military technologies.](https://apnews.com/article/china-military-taiwan-corruption-defense-9c1f0e145a250f2b8bd7f6f3dd4b7083) Those include stealth fighters, the country’s three — soon to be four — aircraft carriers, and a broad expansion of its nuclear arsenal.

China generally ascribes the budget increases to exercises and maintenance and improving the lives of its 2 million service members.

China reiterates opposition to **Taiwan’s independence**

The People’s Liberation Army — the military branch of the ruling Communist Party— has build bases on artificial islands in the South China Sea but its main objective is **asserting**[Chinese control over Taiwan,](https://apnews.com/article/china-taiwan-defense-spending-bcdd4fa977cbccccf6d480b03870b59b) a self-governing democracy Beijing claims as its own territory that has close ties to the U.S.

China deployed a smaller contingent of five planes and seven ships near Taiwan on Wednesday, just days after sending [dozens of aircraft.](https://apnews.com/article/taiwan-china-military-shooting-drills-e74bd7d6fc18ba8cf6780b4ca0831209) Such missions are intended to demoralize and wear down Taiwan’s defenses, which have been bolstered by upgraded U.S. F-16s, tanks and missiles, along with domestically developed armaments.

In his comments at the Congress, Premier Li Qiang told the nearly 3,000 party loyalists that China still preferred a peaceful solution to the Taiwan issue, but “resolutely opposes” those pushing for Taiwan’s formal independence and their foreign supporters.

“We will firmly advance the cause of **China’s reunification** and work with our fellow Chinese in Taiwan to realize the glorious cause of the rejuvenation of the Chinese nation,” Li said.

Taiwan’s defense minister this week said the island is planning to boost military spending in the face of the “rapidly changing international situation and the escalating threats from adversaries.”

Feeling the **economic crunch**

Faced with slower growth, **China will likely prioritize key strategic goals** over social and economic reforms, said Antonia Hmaidi, a senior analyst with the Mercator Institute for China Studies.

“Those resources are more important to the CCP’s goals of advancing a techno-industrial agenda and modernizing the military,” Hmaidi said, using an acronym for the governing Chinese Communist Party.

Chinese President Xi Jinping, who oversees the armed forces, has attempted to **force** through **major reforms** and removed senior military leaders including two former defense ministers and the head of the missile corps.

Whether that will reduce the armed forces’ influence remains unclear though, and the official Xinhua News Agency ran an item after Wednesday’s announcement praising the government for keeping defense spending at below 1.5% of GDP for the last decade and criticizing the U.S. for not cutting its spending.

“China’s development strengthens the world’s forces for peace, and the country will never seek hegemony or engage in expansionism no matter what stage of development it reaches,” Xinhua said, using standard Chinese terms defining its stance as purely defensive in nature.

In its 2004 report on military and security developments involving China, the U.S. Defense Department portrayed China’s ever-growing ambitions, saying the “PLA concepts and capabilities focus on projecting power far from China’s shores.”

The navy’s movement from offshore defense to open seas protection and the air force’s interest in becoming a strategic force “reflect the PLA’s interest in conducting operations beyond (China) and its immediate periphery,” the department said.

#### Unfortunately, the US is struggling to keep up its production of nuclear-powered Virginia-class submarines, which are key to deterring China.

Steve Balestrieri 3-30, 1945 National Security Columnist. He has served as a US Special Forces NCO and Warrant Officer before injuries forced his early separation. In addition to writing for 1945, he covers the NFL for PatsFans.com and his work was regularly featured in the Millbury-Sutton Chronicle and Grafton News newspapers in Massachusetts, 3-30-2025, “The Navy’s Great Virginia-Class Submarine Dilemma It Never Saw Coming,” 1945, <https://www.19fortyfive.com/2025/03/the-navys-great-virginia-class-submarine-dilemma-it-never-saw-coming/>, Accessed 4-3-2025, ARC

The U.S. Navy needs **more Virginia-class submarines**, but U.S. shipyards cannot build enough of them. The need right now is outpacing the supply, and frankly, it isn’t even close to matching up—even as **China pumps out warships**.

The U.S. is facing the retirement of [Los Angeles-class submarines](https://www.19fortyfive.com/2025/01/the-navys-los-angeles-class-is-americas-most-successful-submarine/) to boot.

There are currently **only**[two shipyards](https://www.heritage.org/defense/commentary/the-virginia-class-subs-being-built-newport-news-are-crucial-national-security) that build the Navy’s Virginia-class nuclear-powered attack submarines—one in Groton, Connecticut, and the other in Newport News, Virginia. The shipyard in Connecticut builds only submarines, while Newport News also builds aircraft carriers and other surface ships.

These submarines are **critical to U.S. national security strategy** in the Indo-Pacific, where the Navy must protect shipping lanes and support **freedom of navigation** against China’s rapidly expanding and increasingly aggressive People’s Liberation Army Navy ([PLAN](https://www.19fortyfive.com/2024/11/china-wants-6-aircraft-carriers/)).

Why Does The U.S. Need More Submarines?

First things first. Before going to Congress and asking for additional funds to build a second submarine this year, it is necessary to explain the need.

The PLAN already exceeds the U.S. Navy in overall size and is numerically the largest navy in the world, with more than[370 ships](https://media.defense.gov/2023/Oct/19/2003323409/-1/-1/1/2023-MILITARY-AND-SECURITY-DEVELOPMENTS-INVOLVING-THE-PEOPLES-REPUBLIC-OF-CHINA.PDF) and submarines, including 140 major surface combatants. China has made significant strides in all things naval, and its[rapid modernization](https://www.usni.org/magazines/proceedings/2023/march/submarines-will-reign-war-china) over a short amount of time has been impressive.

Although Virginia-class submarines have been procured at a rate of two boats per year from[FY 2011 through FY 2024](https://sgp.fas.org/crs/weapons/RL32418.pdf), production has never reached that rate. Since 2022, shipyard and supplier-firm workforce and supply-chain challenges have limited production to about **1.2 boats per year**, resulting in a growing backlog of boats that have been procured but not built.

The United States needs its shipbuilding industry to pick up. Naval experts have identified U.S. nuclear-powered subs as one of **the key technological advantages** the Navy holds over the PLAN.

Virginia-class attack submarines are still a generation ahead of Chinese subs in terms of **noise-reduction** technology, **propulsion**, **weapons** **systems**, and **several other areas**. China counters this technological edge with sheer numbers. Just like with aircraft, the relevant question is how many subs a [Virginia-class boat](https://www.19fortyfive.com/2025/01/the-navys-block-vi-virginia-class-submarine-hypersonic-assassin/) would need to defeat to even out the numbers.

The Navy and the shipbuilding industry are working to improve the submarine-construction industrial base to increase the Virginia-class production rate to 2.0 boats per year by 2028, and, eventually, to 2.33 boats per year. The Navy says this rate will be **needed** to not only execute the two-per-year procurement rate, but also to build replacement nuclear-powered attack submarines for the three to five Virginia-class boats that are to be sold to Australia under the [AUKUS treaty](https://www.19fortyfive.com/2025/02/the-u-s-navys-submarine-struggles-threaten-aukus/).

Good News Ahead?

Although the Virginia-class boats are running nearly three years behind schedule, better days might lie ahead. USNI News reported that shipbuilders General Dynamics Electric Boat and HII’s Newport News—the two submarine manufacturers—are in the process of finalizing the detailed design and construction contracts for the future Block V boats USS Baltimore (SSN-812) and USS Atlanta (SSN-813).

“As part of the Fiscal Year 2024 defense spending bill, Congress appropriated $9.4 billion for the two boats, but were **short by almost $2 billion** to cover the rising cost of labor and supplies,” USNI News reported.

That approval from lawmakers will “allow the Navy to cover fact-of-life cost increases on the two FY 24 boats and one FY 25 boat. They also provide funds for additional workforce development and allow us to target funding at specific productivity areas that we are working at with our customer,” General Dynamics CEO Phebe Novakovic said in late January, USNI News reported.

#### Affirming solves. It spurs production of Virginia subs.

Mallory Shelbourne 23, Reporter for USNI News. She previously covered the Navy for *Inside Defense* and reported on politics for *The Hill,* 10-12-2023, "Congressional Commission Calls for Third Nuclear Shipyard to Bolster U.S. Strategic Forces", USNI News, https://news.usni.org/2023/10/12/congressional-commission-calls-for-third-nuclear-shipyard-to-bolster-u-s-strategic-forces, Accessed 3-31-2025, ARC

The Pentagon needs a **third shipyard** that can build **nuclear-powered ships** so the U.S. can keep pace with China and Russia’s nuclear modernization, a congressional commission said in a new report published Thursday.

A third private shipyard would expand industry’s capacity to build nuclear-powered submarines, therefore **bolstering U.S. strategic forces**, according to the Congressional Commission on the Strategic Posture of the United States.

The commission **suggests** the Pentagon “increase shipbuilding capacity, by working with industry to establish or renovate a third shipyard dedicated to production of nuclear-powered vessels, with particular **emphasis** on **nuclear-powered submarines**,” according to the report.

A potential third shipyard would add to the work of General Dynamics Electric Boat and HII’s Newport News Shipbuilding, which build the Navy’s nuclear-powered boats. While the commission is recommending a third private shipyard, it would **require** **significant investment from the government**, USNI News understands.

“The findings of this bipartisan report detail the gravity of the situation we face and emphasize that the **current trajectory** of the U.S. strategic forces are **insufficient** to deter the looming Chinese and Russian threat,” Sen. Roger Wicker (R-Miss.), the ranking member of the Senate Armed Services Committee, said in a statement.

“The report is also a stark reminder of the significant work needed to expand our nuclear submarine industrial base to increase production and reduce repair time. The details of this report should serve as a wakeup call for our armed forces and the national security community as a whole.”

While Electric Boat and Newport News build the Navy’s nuclear-powered ships, the service’s public shipyards have historically maintained the nuclear-powered submarines. But with the backlogs at the public yards in recent years, the private yards have taken on some submarine maintenance work.

The new report includes a wide range of recommendations on nuclear policy, weapons procurement, force posture and infrastructure. The analysis meets a requirement in the Fiscal Year 2022 National Defense Authorization Act calling for a commission to assess the nation’s strategic posture.

The commission’s report makes several references to **AUKUS**, the technology sharing agreement between Australia, the United Kingdom and the United States that **includes** the U.S. **selling** Australia several Virginia-class attack boats while Canberra develops the ability to build and maintain **nuclear-powered attack boats** indigenously.

But lawmakers have voiced **concerns** over the U.S. industrial base’s capacity to support AUKUS while continuing to **build submarines** for the U.S. Navy. Newport News and Electric Boat are currently building approximately 1.2 Virginia boats a year, while the overall program is hundreds of months behind schedule, USNI News previously reported. Former Chief of Naval Operations Adm. Mike Gilday [previously said](https://news.usni.org/2023/03/30/aukus-agreement-will-help-deter-china-from-taiwan-invasion-says-former-pacom-co) industry must build more than two boats per year if the U.S. is going to sell attack subs to the Royal Australian Navy.

#### AUKUS cohesion depends on US capacity to sell Australia Virginia-class subs.

Mallory Shelbourne 23, Reporter for USNI News. She previously covered the Navy for *Inside Defense* and reported on politics for *The Hill,* 10-12-2023, "Congressional Commission Calls for Third Nuclear Shipyard to Bolster U.S. Strategic Forces", USNI News, https://news.usni.org/2023/10/12/congressional-commission-calls-for-third-nuclear-shipyard-to-bolster-u-s-strategic-forces, Accessed 3-31-2025, ARC

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At the same time, the Navy is also recapitalizing the sea-based leg of the nuclear triad with the Columbia-class submarine program, the service’s top acquisition priority.

“In the sea leg, the Navy is scheduled to construct one Columbia-class submarine per year and sustain the Ohio-class in parallel relying on the same infrastructure for both (manufacturing facilities, dry docks, etc.). Additionally, this same workforce and industrial base also support Virginia-class submarine production,” the commission’s report reads.

“As a result, the Navy must consider schedule tradeoffs between the two classes of submarines. The [Office of Management and Budget] as well as the Commission are skeptical that the current infrastructure can simultaneously support conventional and nuclear sustainment, modernization, and construction as scheduled. The AUKUS agreement may place further stress on this capacity.”

The report’s release comes as the Senate Armed Services Committee pushes for supplemental funding in the Fiscal Year 2024 defense policy bill. When marking up the National Defense Authorization Act, the committee called on President Joe Biden “to send emergency supplemental funding requests to address those concerns, to include continued support for Ukraine, additional munitions production, and additional naval vessels and combat vehicles.”

Under a deal between Biden and former House Speaker Kevin McCarthy (R-Calif.) over the debt ceiling limit, lawmakers had to adhere to the administration’s FY 2024 $886 billion request for national defense.

Wicker has argued that any supplemental funding request must include additional support for AUKUS to strengthen the U.S. defense industrial base.

“If we hope to **realize the full potential** of the AUKUS deal, it is **imperative** that the president articulate an achievable plan of action to increase American submarine production that **meets both American and Australian needs**. The enhanced security of the United States and our partners depends on our mutual collaboration and cooperation,” Wicker said in an August statement.

#### AUKUS's credibility is key to deterring Chinese aggression.

Grossman 23 (Derek, senior defense analyst at the RAND Corporation, an adjunct professor at the University of Southern California, “Why China Should Worry About Asia's Reaction to AUKUS,” RAND, 4/15, <https://www.rand.org/blog/2023/04/why-china-should-worry-about-asias-reaction-to-aukus.html>) ARC

When U.S. President Joe Biden met with Australian Prime Minister Anthony Albanese and British Prime Minister Rishi Sunak in San Diego last month, the three leaders announced a crucial next step for the Australia–United Kingdom–United States (AUKUS) security pact. Australia will purchase at least three, and possibly five, Virginia-class nuclear-powered submarines from the United States and eventually, alongside Britain, deploy a new class of nuclear-powered submarines jointly developed by the three nations.

The submarines plan is just one part of the deepening security collaboration among the three countries aimed at countering China. Next steps could include basing U.S. nuclear-capable platforms—such as strategic bombers—in Australia as well as cooperation on hypersonic missiles, cyber operations, quantum computing, and in other areas. All this likely makes AUKUS more consequential for the regional military balance than any other of the so-called mini-lateral groupings, including the Quadrilateral Security Dialogue (Quad) joining Australia, India, Japan, and the United States; or the Five Power Defense Arrangements among Australia, Britain, Malaysia, New Zealand, and Singapore. AUKUS is truly unique because of its exclusive focus on modernizing and enhancing the interoperability of the participants' military capabilities to deter and, if necessary, defeat China in a potential future conflict.

Predictably, Beijing has railed against AUKUS. Chinese Foreign Ministry spokesperson Wang Wenbin accused the three nations of engaging in “hegemonic practice” and said the deal demonstrates a “Cold War mentality” designed to contain China. Beijing has also raised concerns about AUKUS allegedly undermining the international nuclear non-proliferation regime, with Wang warning the three partners against going down this “dangerous path.”

Aside from China's, responses to AUKUS across the Indo-Pacific have been generally positive—or at least not negative—since the pact was announced in September 2021. Some countries, mainly in Southeast Asia, are concerned about the potential for nuclear proliferation. Overall, however, most Indo-Pacific nations either support AUKUS or avoid publicly opposing it, suggesting widespread and varied concerns about China's military buildup, growing power, and intentions in the region. This bodes well for AUKUS' ability to tie in additional allies and partners for the purpose of peacetime deterrence. In the case of AUKUS' closest friends, this could even extend to military operations in a potential war.

As a stalwart U.S. ally with an increasingly strained relationship with China, Japan unsurprisingly supports AUKUS. During a call with Albanese last month, Japanese Prime Minister Fumio Kishida noted that AUKUS would “contribute to the peace and stability of the Indo-Pacific region amidst an increasingly severe security environment.” Last December, Tokyo released (PDF) its new National Security Strategy, which described Beijing's military activities as “unprecedented and the greatest strategic challenge.”

Japan's primary concern is its dispute with China over the Senkaku Islands (which Beijing calls the Diaoyu Islands). But in recent years, Tokyo has increasingly voiced its concerns over Beijing's military pressure against Taipei, as well. Writing in Foreign Policy, Hoover Institution scholar Michael Auslin argued that Japan belongs in AUKUS (making it JAUKUS?). Tokyo hasn't taken an official position, but it is unlikely to engage in any use of nuclear technology for warfare. Fierce domestic political opposition rooted in the public's memory of World War II still exists in Japan. Still, Tokyo is likely to find other parts of the AUKUS agenda, such as quantum computing, more appealing and politically feasible.

South Korea, another critical U.S. ally, hasn't officially weighed in on AUKUS. Understandably, this is because South Korea focuses on North Korea and tries to maintain a delicate balance between China and the United States. However, South Korean President Yoon Suk-yeol is clearly uncomfortable with Chinese assertiveness in the region. In June 2022 in Madrid, he became the first South Korean leader to attend and speak at a NATO summit, where the main topic of discussion was how the alliance could counter China and Russia. Under Yoon, South Korea is reportedly seeking to increase engagement with, and potentially join, the Quad, another security grouping designed in large part to check China. Yoon's administration is also poised to participate in the U.S.-led Chips 4 alliance, alongside Japan and Taiwan, in an effort to diversify semiconductor manufacturing away from China.

When asked as an election candidate in 2021 what he thought of AUKUS, Yoon responded that Seoul did not need the type of nuclear-powered submarines headed for Australia. That said, since the recent test of a submarine-launched ballistic missile by North Korea, Yoon may well change his mind. There are other reasons for Seoul to consider nuclear-powered submarines; indeed, South Korean officials have privately suggested they desire the national prestige and expertise associated with having them. Additionally, polling shows 71 percent of South Koreans in favor of re-stationing nuclear weapons in their country. What's more, Yoon commented in January that South Korea might have to go nuclear to counter a nuclear-armed North Korea. Hence, Seoul might benefit from AUKUS-style arrangements in the future. That said, it is currently very unlikely Washington would accommodate it.

Meanwhile, Taiwan—frequently the target of China's ire—has understandably embraced AUKUS. In the most recent statement on the topic, in March, Taipei's Ministry of Foreign Affairs said it “welcome[d] the steady advancement of AUKUS,” adding “[the ministry] believes that this trilateral cooperation will strengthen deterrence capability in the Indo-Pacific and contribute to the maintenance of regional peace and stability.” Taiwan probably hopes AUKUS speeds up and deepens defense collaboration so that the island can maximize deterrence or effectively leverage the pact in a future conflict.

In Southeast Asia, AUKUS is more controversial. Despite China's encroachments in the South China Sea and elsewhere, virtually all nations are attempting to stay out of great power competition by neither endorsing nor condemning the pact. The region's only strong AUKUS supporter is the Philippines, another U.S. ally that also faces daily Chinese pressure in the disputed South China Sea. For the Philippine government in Manila, AUKUS is a helpful addition to regional security architecture. In 2021, Philippine Foreign Secretary Teodoro Locsin Jr. noted that AUKUS “should restore and keep balance rather than destabilize it.”

Among other Association of Southeast Asian Nations (ASEAN) states, AUKUS gets cautious support. Singapore, for example, has not released a statement since last month's summit in San Diego. But in 2021, Singaporean Prime Minister Lee Hsien Loong and then–Australian Prime Minister Scott Morrison discussed the then-new pact, which Lee reportedly hoped would “contribute constructively to the peace and stability of the region and complement the regional architecture.”

Vietnam, a key emerging U.S. security partner, has likewise remained cautious but supportive. In 2021, Vietnam refused to outright reject AUKUS, warning only that “nuclear energy must be developed and used for peaceful purposes.” Following the recent AUKUS summit, a Hanoi spokesperson said that “peace, stability, cooperation, and development in the region and the world is the common goal of every country, and countries are responsible for contributing to this goal.” Reading between the lines, this implies that China must do its part as well.

Both Indonesia and Malaysia, while skeptical that the pact will be stabilizing, will not oppose it either. In public statements, they have focused only on the possible nuclear proliferation consequences. Indonesia's Ministry of Foreign Affairs merely commented last month that “Indonesia expects Australia to remain consistent in fulfilling its obligations” under the Non-Proliferation Treaty (NPT) and International Atomic Energy Agency (IAEA) Safeguards. Even Malaysia, a far more-outspoken skeptic, acknowledged in a statement “the needs of countries in terms of enhancing defence capabilities” even as it warned that AUKUS must “fully respect and comply” with Malaysia's restrictions on nuclear-powered submarines in its waters. Malaysia also urged all countries to refrain “from any provocation that could potentially trigger an arms race or affect peace and security in the region.”

Even Cambodia—a virtual Chinese client state—has not opposed AUKUS outright, even as it expressed its concerns. In an exchange with Australia in 2021, Foreign Minister and Deputy Prime Minister Prak Sokhonn remarked (PDF) that Cambodia, as a war-torn nation, “expected that AUKUS [would] not fuel unhealthy rivalries and further escalate tension.” Cambodian Prime Minister Hun Sen last month wondered aloud why Cambodia accepted AUKUS' explanation that it would not inject nuclear weapons into the region while Western powers refused to believe Cambodian assurances that Chinese construction at a naval base in southern Cambodia was not for the Chinese military.

Notably, Thailand—another U.S. treaty ally in Southeast Asia—has so far avoided commenting on AUKUS at all, perhaps to maintain cordial and productive relations with China, which it views more benignly than many other ASEAN countries.

India, of course, is the most consequential nation to the success of Washington's Indo-Pacific strategy. It hasn't publicly weighed in on AUKUS—but in a highly telling move, New Delhi in 2022 voted against China and Russia's attempts in the IAEA to derail the pact on the grounds that nuclear sharing for submarine propulsion violated the NPT. New Delhi diligently worked behind the scenes with many IAEA states to uphold the merits of the AUKUS agreement, in a clear move to shut down Beijing. To be sure, there are other reasons for India's vote, such as the AUKUS nations' earlier assistance in getting India into the Nuclear Suppliers Group, an export control regime for nuclear material and technology, and AUKUS members' cooperation with India on counterterrorism. But the vote was primarily aimed at countering China, making it a win for AUKUS.

The one region where the reaction to AUKUS suggests the broadest strategic realignment is Oceania, where there has been a surprising level of support. New Zealand—which has a long China-friendly past and an even longer record of opposing any nuclear-related initiatives—decided, at Washington's invitation, to explore non-nuclear cooperation with AUKUS nations. The new defense minister, Andrew Little, said last month, “When you look at the geostrategic situation we have in the Pacific at the moment, I think the longer-term challenge is that our partners and neighbors will say to us, 'We expect more.'” His comments suggest that New Zealand feels obligated to further assist Pacific Island nations in offering alternatives to China's rise in the region.

Among Pacific Island nations—which, like New Zealand, have traditionally been highly suspicious of anything nuclear—AUKUS has surprisingly robust support. This month, the chairman of the region's most important multilateral body, the Pacific Islands Forum (PIF), said he was “reassured” by AUKUS nations' explanation of their plans and intentions. Fiji, the region's heavyweight and host of the PIF headquarters, openly supports AUKUS. Samoan Prime Minister Fiame Naomi Mataafa said, “This is how Australia sees its role in the security aspects of the region, and we understand that.” To be sure, the Solomon Islands, with whom China last year inked a new security agreement authorizing its navy ships to make routine port calls, expressed concerns over keeping the region a nuclear-free zone, as directed by the PIF's Treaty of Rarotonga. But only Tuvalu has thus far condemned AUKUS. Its foreign minister tweeted, “As we discuss nuclear-powered submarines in the Pacific, we must also address concerns about increased militarization of the region.”

If most Indo-Pacific nations strongly or cautiously support AUKUS—or refuse to condemn it—then Beijing will have more geostrategic and military implications to worry about than AUKUS itself. China will thus need to work overtime to undermine not only AUKUS, but also those who might enable it with their support, acquiescence, or silence. Besides China, the small handful of nations that have outright opposed the deal are largely pariah states aligned with Beijing, specifically Myanmar and North Korea. Beyond the region, China's “no limits” partner, Russia, opposes it too. But the fact that these countries are such a small minority suggests that AUKUS—as long as it continues to assuage nuclear-proliferation concerns—will be viewed in the region as a legitimate counter to Chinese military excesses.

#### great power war 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-prof**i**lesgreat-power-co**n**flict/] ARC

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 about a one-in-three chance that a new great power war breaks out in roughly the next 30 years.¶ Few wars cause more than a million casualties and the next great power war would probably be smaller than that. However, there’s some chance it could escalate massively. Today the great powers have much larger economies, more powerful weapons, and bigger military budgets than they did in the past. An all-out war could kill far more people than even World War II, the worst war we’ve yet experienced.¶ Could it become an existentially threatening war — one that could cause human extinction or significantly damage the prospects of the long-term future? It’s very difficult to say. But my best current guess is that the chance of an existential catastrophe due to war in the next century is somewhere between 0.05% and 2%.¶ Neglectedness ¶ War is a lot less neglected than some of our other top problems. There are thousands of people in governments, think tanks, and universities already working on this problem. But some solutions or approaches remain neglected. One particularly promising approach is to develop expertise at the intersection of international conflict and another of our top problems. Experts who understand both geopolitical dynamics and risks from advanced artificial intelligence, for example, are sorely needed.¶ Solvability ¶ Reducing the risk of great power war seems very difficult. But there are specific technical problems that can be solved to make weapons systems safer or less likely to trigger catastrophic outcomes. And in the best case, working on this problem can have a leverage effect, making the development of several dangerous technologies safer by improving international cooperation and making them less likely to be deployed in war.¶ At the end of this profile, I suggest five issues which I’d be particularly excited to see people work on. These are:¶ Developing expertise in the riskiest bilateral relationships¶ Learning how to manage international crises quickly and effectively and ensuring the systems to do so are properly maintained¶ Doing research to improve particularly important foreign policies, like strategies for sanctions and deterrence¶ Improving how nuclear weapons and other weapons of mass destruction are governed at the international level¶ Improving how such weapons are controlled at the national level¶ ¶ Why might preventing great power war be an especially pressing problem?¶ A modern great power war — an all-out conflict between the world’s most powerful countries — could be the worst thing to ever happen to humanity.¶ Historically, such wars have been exceptionally destructive. Sixty-six million people died in World War II, likely the deadliest catastrophe humanity has experienced so far.¶ Since World War II, the global population and world economy have continued to grow, nuclear weapons have proliferated, and military technology has continued to advance. This means the next world war could be even worse, just as World War II was much deadlier than World War I.¶ It’s not guaranteed that such a war will break out. And if it does, it may not escalate to such a terrible extent. But the chance can’t be ignored. In fact, there are reasons to think that the odds of World War III breaking out this century are worryingly high.¶ A modern great power war would be devastating for people alive today. But its effects could also persist long into the future. That’s because there is a substantial chance that this century proves to be particularly important. Technologies with the potential to cause a global catastrophe or radically reshape society are likely to be invented. How we choose to develop and deploy them could impact huge numbers of our descendants. And these choices would be affected by the outcomes of a major war.¶ To be more specific, there are three main ways great power conflict could affect the long-term future:¶ High international tension could increase other risks. Great power tensions could make the world more dangerous even if they don’t lead to war. During the Cold War, for example, the United States and the USSR never came into direct conflict but invested in bioweapons research and built up nuclear arsenals. This dynamic could return, with tension between great powers fueling races to develop and build new weapons, raising the risk of a disaster even before shots are fired.¶ War could cause an existential catastrophe. If war does break out, it could escalate dramatically, with modern weapons (nuclear weapons, bioweapons, autonomous weapons, or other future technologies) deployed at unprecedented scale. The resulting destruction could irreparably damage humanity’s prospects.¶ War could reshape international institutions and power balances. While such a catastrophic war is possible, it seems extremely unlikely. But even a less deadly war, such as another conflict on the scale of World War II, could have very long-lasting effects. For example, it could reshape international institutions and the global balance of power. In a pivotal century, different institutional arrangements and geopolitical balances could cause humanity to follow different long-term trajectories.¶ The rest of this profile explores exactly how pressing a problem great power conflict is. In summary:¶ Great power relations have become more tense. (More.)¶ Partly as a result, a war is more likely than you might think. It’s reasonable to put the probability of such a conflict in the coming decades somewhere between 10% and 50%. (More.)¶ If war breaks out, it would probably be hard to control escalation. The chance that it would become large enough to be an existential risk cannot be dismissed. (More.)¶ This makes great power war one of the biggest threats our species currently faces. (More.)¶ It seems hard to make progress on solving such a difficult problem (more) — but there are many things you can try if you want to help (more).¶ International tension has risen and makes other problems worse¶ Imagine we had a thermometer-like device which, instead of measuring temperature, measured the level of international tension.2 This ‘tension metre’ would max out during periods of all-out global war, like World War II. And it would be relatively low when the great powers3 were peaceful and cooperative. For much of the post-Napoleonic 1800s, for example, the powerful European nations instituted the Concert of Europe and mostly upheld a continental peace. The years following the fall of the USSR also seem like a time of relative calm, when the tension metre would have been quite low.4¶ How much more worried would you be about the coming decades if you knew the tension metre would be very high than if you knew it would be low? Probably quite a lot. In the worst case, of course, the great powers could come into direct conflict. But even if it doesn’t lead to war, a high level of tension between great powers could accelerate the development of new strategic technologies, make it harder to solve global problems like climate change, and undermine international institutions.¶ During the Cold War, for instance, the United States and USSR avoided coming into direct conflict. But the tension metre would still have been pretty high. This led to some dangerous events:¶ A nuclear arms race. The number of nuclear warheads in the world grew from just 300 in 1950 to over 64,000 in 1986.¶ The development of new bioweapons. Despite signing the Biological Weapons Convention in 1972, the search for military advantages motivated Soviet decision makers to continue investing in bioweapon development for decades. Although never used in combat, biological agents were accidentally released from research facilities, resulting in dozens of deaths and threatening to cause a pandemic.5¶ Nuclear close calls. Military accidents and false alarms happened regularly, and top decision makers were more likely to interpret these events hostilely when tensions were high. On several occasions it seems the decision about whether or not to start a nuclear war came down to individuals acting under stress and with limited time.¶ This makes international tension an existential risk factor. It’s connected to a number of other problems, which means reducing the level of international tension would lower the total amount of existential risk we face.¶ The level of tension today¶ Recently, international tension seems to have once again been rising. To highlight some of the most salient examples:¶ China-United States relations have deteriorated, leading to harsh diplomatic rhetoric and protectionist trade policies that aim to reduce the countries’ economic interdependence.¶ Russia’s invasion of Ukraine has killed about a hundred thousand people so far, raised the risk of nuclear war, and sent United States-Russia relations to their lowest point since the Cold War.¶ Chinese and Indian soldiers fought deadly skirmishes along their countries’ disputed border in 2020–21.¶ These dynamics raise an important question: how much more dangerous is the world given this higher tension than it would be in a world of low tension?¶ I think the answer is quite a bit more dangerous — for several reasons. First, international tension seems likely to make technological progress more dangerous. There’s a good chance that, in the coming decades, humanity will make some major technological breakthroughs. We’ve discussed, for example, why one might worry about the effects of advanced artificial intelligence systems or biotechnology. The level of tension could strongly affect how these technologies are developed and governed. Tense relations could, for example, cause countries to neglect safety concerns in order to develop technology faster.6¶ Second, great power relations will strongly influence how nations do, or do not, cooperate to solve other global collective action problems. For example, in 2022, China withdrew from bilateral negotiations with the United States over climate action in protest of what it perceived as American diplomatic aggression in Taiwan. That same year, efforts to strengthen the Biological Weapons Convention were reportedly hampered by the Russian delegation after their country’s invasion of Ukraine raised tensions with the United States and other western countries.¶ And third, if relations deteriorate severely, the great powers could fight a war.¶ How likely is a war?¶ Wars are destructive and risky for all countries involved. Modern weapons, especially nuclear warheads, make starting a great power war today seem like a suicidal undertaking.¶ But factors like the prevalence of war throughout history, the chance that leaders make mistakes, conflicting ideologies, and commitment problems, make me think that conflict could break out anyway.¶ On balance, I think such an event is somewhat unlikely but hardly unthinkable. To quantify this: I put the chance we experience some kind of war between great powers before 2050 at about one-in-three.7¶ War has occurred regularly in the past¶ One reason to think a war is quite likely is that such conflicts have been so common in the past. Over the past 500 years, about two great power wars have occurred per century.8¶ Naively, this would mean that every year there’s a 2% chance such a war occurs, implying the chance of experiencing at least one great power war over the next 80 years — roughly until the end of the century — is about 80%.9¶ This is a very simple model. In reality, the risk is not constant over time and independent across years. But it shows that if past trends simply continue, the outcome is likely to be very bad.¶ Has great power war become less likely?¶ One of the most important criticisms of this model is that it assumes the risk is constant over time. Some researchers have argued instead that, especially since the end of World War II, major conflicts have become much less likely due to:¶ Nuclear deterrence: Nuclear weapons are so powerful and destructive that it’s just too costly for nuclear-armed countries to start wars against each other.10¶ Democratisation: Democracies have almost never gone to war against each other, perhaps because democracies are more interconnected and their leaders are under more public pressure to peacefully resolve disputes with each other.11 The proportion of countries that are democratic has increased from under 10% in 1945 to about 50% today.¶ Strong economic growth and global trade: Global economic growth accelerated following World War II and the value of global exports grew by a factor of almost 30 between 1950 and 2014. Since war disrupts economies and international trade, strong growth raises the costs of fighting.12¶ The spread of international institutions: Multilateral bodies like the United Nations General Assembly and Security Council promote diplomatic dialogue and facilitate coordination to punish transgressors.13¶ It is true that we are living through an unusually long period of great power peace. It’s been about 80 years since World War II. We just saw that a simple model using the historical frequency of great power wars suggests there was only a 20% chance of going that long without at least one more war breaking out. This is some evidence in favour of the idea that wars have become significantly less common.¶ ¶ At the same time, we shouldn’t feel too optimistic.¶ The numerous close calls during the Cold War suggest we were somewhat lucky to avoid a major war in that time. And a 20% chance of observing 80 years of peace is not that low.14 Structural changes might have dramatically reduced the likelihood of war. Or perhaps we’ve just been lucky. It could even be that technological advances have made war less likely to break out, but more deadly when it occurs, leaving the overall effect on the level of risk ambiguous. It just hasn’t been long enough to support a decisive view.15¶ So while the recent historical trend is somewhat encouraging, we don’t have nearly enough data to be confident that great power war is a thing of the past. To better predict the likelihood of future conflict, we should also consider distinctive features of our modern world.16¶ One might think that a modern great power war would simply be so destructive that no state leader would ever choose to start one. And some researchers do think that the destruction such a war would wreak globally makes it less likely to occur. But it would be hard to find anyone who claims this dynamic has driven the risk to zero.¶ First, a war could be started by accident.¶ Second, sometimes even prudent leaders may struggle to avoid a slide towards war.¶ We could blunder into war¶ An accidental war can occur if one side mistakes some event as an aggressive action by an adversary.¶ This happened several times during the Cold War. The earlier example of the wayward American reconnaissance plane shows how routine military exercises carry some escalation risk. Similarly, throughout history, nervous pilots and captains have caused serious incidents by attacking civilian planes and ships.17 Nuclear weapons allow for massive retaliatory strikes to be launched quickly — potentially too quickly to allow for such situations to be explained and de-escalated.¶ It is perhaps more likely, though, that an accidental war could be triggered by a technological malfunction. Faulty computers and satellites have previously triggered nuclear close calls. As monitoring systems have become more reliable, the rate at which such accidents have occurred has been going down. But it would be overconfident to think that technological malfunctions have become impossible.¶ Future technological changes will likely raise new challenges for nuclear weapon control. There may be pressure to integrate artificial intelligence systems into nuclear command and control to allow for faster data processing and decision making. And AI systems are known to behave unexpectedly when deployed in new environments.18¶ New technologies will also create new accident risks of their own, even if they’re not connected to nuclear weapon systems. Although these risks are hard to predict, they seem significant. I’ll say more about how such technologies — including AI, nuclear, biological, and autonomous weapons — are likely to increase war risks later.¶ Leaders could choose war¶ All that said, most wars have not started by accident. If another great power war does break out in the coming decades, it is more likely to be an intentional decision made by a national leader.¶ Explaining why someone might make such a costly, destructive, unpredictable, and risky decision has been called “the central puzzle about war.” It has motivated researchers to search for “rationalist” explanations for war. In his 2022 book Why We Fight, for example, economist Chris Blattman proposes five basic explanations: unchecked interests, intangible incentives, uncertainty, commitment problems, and misperceptions.19¶ This section discusses how great power tensions may escalate to war in the next few decades. It focuses on three potential conflicts in particular: war between the US and China, between the US and Russia, and between China and India. These are discussed because each of these countries are among the world’s largest economies and military spenders, and seem particularly likely to fight. At the end, I briefly touch on other potential large conflicts.¶ United States-China¶ The most worrying possibility is war between the United States and China. They are easily the world’s largest economies. They spend by far the most on their militaries. Their diplomatic relations are tense and have recently worsened. And their relationship has several of the characteristics that Blattman identifies as causes of war.¶ At the core of the United States-China relationship is a commitment problem.¶ China’s economy is growing faster than the United States’. By some metrics, it is already larger.20 If its differential growth continues, the gap will continue to widen between it and the United States. While economic power is not the sole determinant of military power, it is a key factor.21¶ The United States and China may be able to strike a fair deal today. But as China continues to grow faster, that deal may come to seem unbalanced. Historically, such commitment problems seem to have made these kinds of transition periods particularly dangerous.22¶ In practice, the United States and China may find it hard to agree on rules to guide their interactions, such as how to run international institutions or govern areas of the world where their interests overlap.¶ The most obvious issue which could tip the United States-China relationship from tension into war is a conflict over Taiwan. Taiwan’s location and technology industries are valuable for both great powers.¶ This issue is further complicated by intangible incentives.¶ For the United States, it is also a conflict over democratic ideals and the United States’ reputation for defending its allies.¶ For China, it is also a conflict about territorial integrity and addressing what are seen as past injustices.¶ Still, forecasts suggest that while a conflict is certainly possible, it is far from inevitable. As of 8 June 2023, one aggregated forecast23 gives a 17% chance of a United States-China war breaking out before 2035.24¶ A related aggregated forecast of the chance that at least 100 deaths occur in conflict between China and Taiwan by 2050 gives it, as of 8 June 2023, a much higher 68% chance of occurring.25¶ United States-Russia¶ Russia is the United States’ other major geopolitical rival.¶ Unlike China, Russia is not a rival in economic terms: even after adjusting for purchasing power, its economy is only about one-fifth the size of the United States’.¶ However, Russia devotes a substantial fraction of its economy to its military. Crucially, it has the world’s largest nuclear arsenal. And Russian leadership has shown a willingness to project power beyond their country’s borders.¶ ¶ Top five countries by estimated military spending, 2021. Source: SIPRI¶ Russia’s 2022 invasion of Ukraine demonstrated the dangers of renewed rivalry between Russia and the United States-led West. The war has already been hugely destructive: the largest war in Europe since World War II, with hundreds of thousands of casualties already and no end to the conflict in sight. And it could get much worse. Most notably, Russian officials have repeatedly refused to rule out the use of nuclear weapons.¶ Unchecked interests and intangible incentives are again at play here. Vladimir Putin leads a highly-centralised government. He has spoken about how his desire to rebuild Russia’s reputation played in his decision to invade Ukraine.¶ Given their ideological differences and history of rivalry, it is reasonable to expect that the United States and Russia will continue to experience dangerous disagreements in the future. As of 8 June 2023, an aggregated forecast gives a 20% chance that the United States and Russia will fight a war involving at least 1,000 battle deaths before 2050.¶ China-India¶ India is already the world’s third-largest economy. If national growth rates remain roughly constant, the size of the Indian economy will surpass that of the United States’ sometime this century. India also has nuclear weapons and is already the world’s third-largest military spender (albeit at a much lower level than China or the United States).¶ One reason to worry that China and India could fight a war is that they already dispute territory along their border. Countries that share a border, especially when it is disputed, are more likely to go to war than countries that do not. By one count, 88% of the wars that occurred between 1816 and 1980 began as wars between neighbours.26¶ In fact, China and India already fought a brief but violent border war in 1962. Deadly skirmishes have continued since, resulting in deaths as recently as 2020.¶ Forecasters agree that a China-India conflict seems relatively (though not absolutely) likely. An aggregated forecast gives a 19% chance of war before 2035.¶ Other dangerous conflicts¶ These three conflicts — United States-China, United States-Russia, and China-India — are not the only possible great power wars that could occur. Other potential conflicts could also pose existential risk, either because they drive dangerous arms races or see widespread deployment of dangerous weapons.¶ We should keep in mind India-Pakistan as a particularly likely conflict between nuclear-armed states and China-Russia as a potential, though unlikely, conflict between great powers with a disputed border and history of war. Plus, new great powers may emerge or current great powers may fade in the years to come.¶ While I think we should prioritise the three potential conflicts I’ve highlighted above, the future is highly uncertain. We should monitor geopolitical changes and be open to changing our priorities in the future.¶ Overall predictions¶ Below is a table listing relevant predictions from the forecasting platform Metaculus, including the number of predictions made, as of 10 March 2023. Note the different timescales and resolution criteria for each question; they may not be intuitively comparable.¶ ¶ 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 334,000 battle deaths. And the worst war, World War II, had almost 17 million battle deaths.30¶ The number of battle deaths is only one way to measure the badness of wars. We could also consider the proportion of the population of the countries involved who were killed in battle. By this measure, the worst war since 1816 was not World War II. Instead, it’s the Paraguayan War of 1864–70. In that war, 30 soldiers died for every 1,000 citizens of the countries involved. It’s even worse if we also consider civilian deaths; while estimates are very uncertain, it’s plausible that about half of the men in Paraguay, or around a quarter of the entire population, was killed.31¶ What if instead we compared wars by the proportion of the global population killed? World War II is again the worst conflict since 1816 on this measure, having killed about 3% of the global population. Going further back in time, though, we can find worse wars. Ghengis Khan’s conquests likely killed about 9.5% of people in the world at the time.¶ The heavy tail means that some wars will be shockingly large.32 The scale of World War I and World War II took people by surprise, including the leaders who initiated it.¶ It’s also hard to know exactly how big wars could get. We haven’t seen many really large wars. So while we know there’s a heavy tail of potential outcomes, we don’t know what that tail looks like.¶ That said, there are a few reasons to think that wars much worse than World War II are possible:¶ We’re statistically unlikely to have brushed up against the end of the tail, even if the tail has an upper bound.¶ Other wars have been deadlier on a per-capita basis. So unless wars involving countries with larger populations are systematically less intense, we should expect to see more intense wars involving as many people as World War II.¶ Economic growth and technological progress are continually increasing humanity’s war-making capacity. This means that, once a war has started, we’re at greater risk of extremely bad outcomes than we were in the past.¶ So how bad could it get? How bad could a modern great power war be? Over time, two related factors have greatly increased humanity’s capacity to make war. 33 First, scientific progress has led to the invention of more powerful weapons and improved military efficiency. Second, economic growth has allowed states to build larger armies and arsenals. Since World War II, the world economy has grown by a factor of more than 10 in real terms; the number of nuclear weapons in the world has grown from basically none to more than 9,000, and we’ve invented drones, missiles, satellites, and advanced planes, ships, and submarines. Ghengis Khan’s conquests killed about 10% of the world, but this took place over the course of two decades. Today that proportion may be killed in a matter of hours. First, **nuclear weapons** could be used. Today there are around 10,000 nuclear warheads globally.34 At the peak of nuclear competition between the United States and the USSR, though, there were 64,000. If arms control agreements break down and competition resurges among two or even three great powers, nuclear arsenals could expand. In fact, China’s arsenal is very likely to grow — though by how much remains uncertain. Many of the nuclear weapons in the arsenals of the great powers today are at least 10 times more powerful than the atomic bombs used in World War II.35 Should these weapons be used, the consequences would be catastrophic. By any measure, such a war would be by far the most destructive, dangerous event in human history, with the potential to cause billions of deaths. The probability that it would, on its own, lead to humanity’s extinction or unrecoverable collapse, is contested. But there seems to be some possibility — whether through a **famine caused by nuclear winter**, or by **reducing humanity’s resilience** enough that something else, like a catastrophic pandemic, would be far more likely to reach extinction-levels (read more in our problem profile on nuclear war). Nuclear weapons are complemented and amplified by a variety of other modern military technologies, including improved missiles, planes, submarines, and satellites. They are also not the only military technology with the potential to cause a global catastrophe — bioweapons, too, have the potential to cause massive harm through accidents or unexpected effects. 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.

# 2AC

## AT: C1

#### Declining government budgets make tradeoffs inevitable.

Schleicher 23 [David Schleicher is a professor at Yale Law School. He is the author of the book In a Bad State: Responding to State and Local Budget Crises.; “The Era of Flush State Budgets Is Over”; The Atlantic; June 4, 2023; https://www.theatlantic.com/ideas/archive/2023/06/state-budgets-federal-funding-california-new-york/674264/]//eleanor

As part of the deal to extend the debt limit, President Joe Biden and Congress agreed to rescind about $30 billion that had originally been allocated in 2021’s American Rescue Plan, some of which was going to be sent to state and local governments for a variety of projects. The amount isn’t that large, at least by federal-budget standards, but it is indicative of a huge change in policy. The federal response to COVID-19 included enormous amounts of mostly unconditional fiscal aid to states, cities, and other local governments. But this era of huge federal aid, and the flush state and local budgets it helped create, is over.

In its place will be a period of state fiscal retrenchment. Between the huge buckets of federal aid and the strong economy of the past few years, state budgets have never been healthier. Some states and cities have used this time to address long-standing fiscal problems and to sock away significant “rainy day” funds, which will ease the coming crunch. But others have not, instead using the money to build out new government programs or cut taxes, policies that will prove hard to reverse even when budgets get tighter.

And they are getting tighter. Across the country, state and local tax and other revenues are declining, and the outcome will be particularly bad for transit agencies dependent on farebox revenue where many fewer people are riding transit and for cities reliant on downtown commercial property taxes where more people are working from home. When the flow of federal money to state and local budgets runs out, some jurisdictions—including California, Illinois, and New York City—will face enormous budget gaps.

People have become used to the state and local politics that were ushered in by the full budgets written amid the growing economy of the late 2010s, and the boom in state revenue around COVID. During these flush years, even some liberal politicians supported tax cuts and even some conservative ones supported increasing pay for teachers. The next few years will not look like that. Rather than new programs and tax reductions, we are going to see a number of states and localities forced to cut back. Police departments will be partially defunded not because of political preferences but because of fiscal necessity, despite worries about crime; class sizes in public schools will increase because fewer teachers will be hired. Federal efforts to encourage green infrastructure will be partially frustrated by declining state and local investment. Some places will raise taxes. And, in the medium term, we are likely to see severe fiscal crises in at least a few jurisdictions, like what we saw in Detroit in 2013.

The central lesson of the past few years is that although federal aid to state and local governments can be extremely useful in heading off economic crises, it should be paired with conditions that encourage states and cities to budget responsibly. Congress could still encourage some changes in state and local fiscal policy. Achieving these reforms would have been much easier when federal money was flowing; now, however, we’ll be able to see the need for them more clearly.

Federal aid for states and cities came in several packages in 2020 and 2021 and was crucial in ensuring that the economic shock of COVID didn’t turn into a giant recession. One reason the post-2007 Great Recession was so big was that it led to a huge downturn in state and local employment, substantially extending the economic decline. States and cities ended up hiding a lot of their lost revenue in underfunded public-pension systems, and the consequences persist to this day. During the Great Recession, interest rates were low and unemployment was high, which should have led to massive investment in new infrastructure, but states and cities used their borrowing capacity to accrue pension debt (ask yourself, where are the infrastructural wonders of the past 20 years?). Some jurisdictions, notably Detroit and Puerto Rico, were forced to default on their debts.

#### They will say the government still has some money. If that’s true, then deficit spending solves.

Vicki Needham 18, Author at the Hill, 2-11-2018, "Trump, GOP at new crossroads on deficit", Hill, https://thehill.com/policy/finance/373277-trump-gop-at-new-crossroads-on-deficit/, Accessed 11-14-2024, ARC

Congressional Republicans who for years breathed fire about fiscal restraint have opened the floodgates to spending, prompting criticism from GOP budget hawks and incredulity from outside groups worried about the nation’s spiraling level of debt. Congress sent President Trump a $1.5 trillion tax-cut bill in December, and on Friday approved a massive budget measure that would boost spending over the next decade by $300 billion, giving Republican leaders another legislative victory. The legislation eliminates budget ceilings put into place by a 2011 budget law agreed to by President Obama and former Speaker John Boehner (R-Ohio), and allows federal funds to flow more freely to the Pentagon and a host of nondefense programs. Trump, GOP leaders in both chambers and a majority of Republicans in the House and Senate back the bill, but it has been fiercely criticized by its opponents within the party as a betrayal. “Republicans have lost every single bit of credibility on the idea that they care at all about debts and deficits,” former Rep. Jason Chaffetz (R-Utah) said Friday on Fox Business’s “Mornings with Maria” show. “They can talk all they want, but when they had the chance to do it, they caved and they spent so much money it's stunning,” added Chaffetz, referring to the GOP’s control of the White House and Congress. The conservative House Freedom Caucus opposed the measure, and deficit hawks ripped the bill as it moved toward passage. “This spending proposal is disgusting and reckless — the biggest spending increase since 2009,” said conservative Rep. Justin Amash (R-Mich.), one of 67 House Republicans to vote against it. Republican Sen. Rand Paul of Kentucky was so furious about the bill he refused to let the Senate vote on it until 1 a.m. Friday, angering his colleagues in the process and forcing lawmakers to close the government for several hours.

#### They haven’t specified a threshold to tradeoff aside from vague statements about certain programs being “on the chopping block.” There’s a reason they haven’t read a single piece of evidence about both the aff and renewabled. Hold the line against incomplete arguments.

#### No tradeoff---fiat goes through the Department of Energy---not [their scenario].

USA Gov No Date, Official US government website, xx-xx-xxxx, "U.S. Department of Energy (DOE)", USA Gov, https://www.usa.gov/agencies/u-s-department-of-energy, Accessed 4-2-2025, ARC

The Department of Energy (DOE) manages the United States' **nuclear infrastructure** and administers the **country's energy policy**. The Department of Energy also funds scientific research in the field.

#### Renewables fail---fossil fuel dependence, faulty infrastructure, and supply-chain issues.

Rees ’23 [William E.; January, Professor Emeritus at the University of British Columbia and former director of the School of Community and Regional Planning the UBC, Ph.D. in population ecology from the University of Toronto; The Journal of Population and Sustainability, “Overshoot: Cognitive Obsolescence and the Population Conundrum,” vol. 7, no, 1]

Reductionist blinkers on, green energy advocates tend to gloss over or dismiss the evidence that the much-vaunted renewable energy transition isn’t really happening as advertised. In 2021 fossil fuels still provided ~82 percent of the world’s primary energy; to put it in temporal terms, oil, coal and natural gas powered the globe for 300 of 365 days; hydro and nuclear power contributed forty days; modern non-hydro renewables – solar panels, wind turbines – where most investment is going gave us just eighteen days. Modern renewables produce electricity, but even in this domain fossil fuels are the largest contributors at 61 per cent of the world’s power supply; non-hydro renewables provided twelve per cent wind and solar only about nine per cent (from data in BP, 2022). A big part of the problem is that growth in demand for energy due to rising incomes and burgeoning populations in middle and low-income countries often outstrips the build-out of modern renewable sources (Chaurasia, 2020; Heinberg, 2022). But there are many other obstacles to a smooth energy transition: politically acceptable technologies are largely fossil-fuel (FF) dependent in manufacturing and installation; the associated mining, refining and transportation are otherwise ecologically problematic; renewables, hydrogen included, still face numerous technical problems; RE equipment/infrastructure is not ‘renewable’, it wears out and is merely replaceable (mostly using FF); grid-scale wind and solar generation is actually costlier than alternatives and becomes more expensive the higher their share of production; there are emerging supply-chain issues; and, in any case, electricity cannot substitute for many uses of FF (Heinberg, 2022; Schernikau et al., 2022; Seibert and Rees, 2021; Rees, 2022a; Michaux, 2021a,b; Turiel, 2020a,b). Even if all such problems were overcome, to replace just 45 per cent of FF use with electricity by 20307 would require building the equivalent of ~1.2 times the entire present cumulative global stock of wind and solar installations every year for the next seven years (based on data from BP, 2022), generously assuming that one unit of wind/solar electricity = ~2.6 units of FF energy; that all uses of FF can be electrified; and that there will be no increase in demand for energy). This is obviously an impossible scenario. Indeed, there is no practical way to quantitatively substitute electricity for fossil fuels on a climate-friendly schedule. The fact is that, despite the significant uptake of modern renewables in the electricity sector and the ebullient assertions of RE advocates, atmospheric CO2 concentrations are still increasing (Figure 1). We should also note that practical carbon-capture-and-storage techniques at scale continue to elude us; to imply that such non-existent technologies will help achieve net-zero emissions by 2050 adds to the dangerous illusion that a smooth energy transition is underway (Spratt and Dunlop, 2021; Dyke et al., 2021).8 As matters stand, the world will blow past the 1.5 C° and likely also the 2.0 C° global warming limits set by the IPCC. Earth has already warmed by >1.1 C° and prominent climate scientists assert that, due to the prevailing energy imbalance and short-term lag effects, ‘more than 0.5°C additional global warming is [already] in the pipeline’ (Hansen, 2018: 9; see also Spratt and Dunlop, 2021). Indeed, we are currently on track for ~2.7 C° warming and catastrophic climate damage.

## AT: C2

#### 1] 2025 will see global proliferation due to expiring agreements and Trump.

Dave Lawler 3-10, CEO of Kimmeridge Texas Gas (KTG) and a Director of Commonwealth LNG. KTG is a gulf coast exploration and production company currently producing 400 MMCFD, with growth plans to reach 1 BCFD by 2029. CEO of BPX Energy, 3-10-2025, "Trump's nuclear dilemma: "Greatest threat" is getting bigger", Axios, https://www.axios.com/2025/03/11/trump-nuclear-weapons-iran-russia-china, Accessed 3-12-2025, ARC

The flipside: Trump's [withdrawal of U.S. support for Kyiv](https://www.axios.com/2025/03/03/ukraine-military-aid-us-trump) has U.S. **allies** debating whether to **develop their own nukes**, rather than depend on Washington.

**Polish** Prime Minister Donald Tusk said Friday that his country would have to **explore** "opportunities related to **nuclear weapons**" due to the "profound change of **American geopolitics**."

**French** President Emmanuel Macron also said last week that he would consult with European allies like Germany about including them under the French nuclear umbrella.

Trump's ally-bashing has also turbocharged the debate in **South Korea** over whether a domestic nuclear program is needed to counter nuclear-armed [North Korea](https://www.axios.com/world/north-korea).

Some experts fear a new era of nuclearization.

"The belief that the United States has no interest in defending allies, which is the conclusion that allies are rapidly and rightly drawing, is very likely to cause proliferation," says James Acton, co-director of the Nuclear Policy Program at the Carnegie Endowment for International Peace.

"I think it's virtually **inevitable** they will **explore their options**, and there is a realistic prospect that some of those explorations turn into weapons programs," Acton says, emphasizing that likelihood for South Korea in particular.

Meanwhile, the **last major** U.S.-Russia **arms control agreement**, [New START](https://www.axios.com/2021/01/21/biden-russia-nuclear-treaty), is **less than a year from expiration**.

That treaty can't be extended, and any new agreement that constrains the U.S. but not China is unlikely to pass muster in Washington.

China, meanwhile, **rejects** arms control talks outright — at least until its rapidly advancing nuclear program reaches parity with the other major powers.

A former senior U.S. official conceded to Axios that it's "difficult to conceive of" a scenario where Beijing comes to the table for the sort of trilateral talks Trump envisions.

"There's not a lot of carrots. You mostly offer them the stick," the official said.

"The problem is that a lot of the available sticks they're already brandishing at the Chinese right now — **tariffs** and other things."

Key quote: "I think we're going into a period of time where we won't have any operative nuclear arms control agreements," the former official says.

A National Security Council spokesperson did not provide a comment for this story.

Flashback: Trump made two dramatic moves in the nuclear arena in his first term — [pulling out of the 2015 Iran deal](https://www.axios.com/2025/01/06/trump-iran-nuclear-deal), and holding two summits to try to convince North Korea's Kim Jong-un to denuclearize.

Both **Tehran** and **Pyongyang** have made significant nuclear advances since then.

What to watch: Trump's letter to Khamenei and early [comments](https://thediplomat.com/2025/02/will-kim-jong-un-meet-trump-again/) on Kim suggest leader-to-leader nuclear diplomacy is back on the menu.

But force of personality alone won't be enough to keep the world's "greatest threat" in check.

#### 1] New fuels & transportation methods solve.

**AC ’24** [Arms Control; International Organization; February 5; Center for Arms Control and Non-Proliferation; “Fact Sheet: Nuclear Energy Technologies,” https://armscontrolcenter.org/fact-sheet-nuclear-energy-technologies/; DOA: 3-23-2025] tristan

Most **current** and **proposed** **reactors** use **fuel** that is **not** **weapons**-**usable**. Also, **plutonium** in spent fuel could not be **used** for weapons without a **reprocessing** **facility**. As long as safeguards and verification measures remain robust, many designs are fairly **proliferation** **resistant**. For instance, **sealed** core **reactors** where the reactor is **transported** as a single **unit** means the **country** where it is operating does **not** **need** to have any **knowledge** of the nuclear **fuel** **cycle** at all.

#### 1] Turn: New tech advancements reduce prolif risks.

NIA, xx-xx-2025, "Global Security", Nuclear Innovation Alliance, <https://nuclearinnovationalliance.org/global-security> [The Nuclear Innovation Alliance (NIA) is a non-profit, non-partisan, “think-and-do” tank based out of Washington D.C. Through policy analysis, research, outreach, and education, we are catalyzing the next era of nuclear energy.] DOA: 4/1/2025

Nuclear Non-Proliferation

Nuclear non-proliferation principles form the core of the international governance framework for nuclear technology. With a basis in President Eisenhower’s “Atoms for Peace” initiative, international trade in nuclear technologies has supported the global economy and enhanced diplomatic relationships. With the oversight of the International Atomic Energy Agency, which has unique powers to impose safeguards for civil nuclear technology, the world has largely avoided proliferation from civilian nuclear sectors.

The next generation of nuclear power can continue to meet President Eisenhower’s mission by providing technologies that feature key non-proliferation features. Although new technologies can support this goal, preventing the proliferation of nuclear weapons requires strong global governance. Advanced reactors can help to reduce proliferation risk both through technological innovation and by restoring the U.S. role in international nuclear energy markets, serving as a foundation for an “Atoms for Peace 2.0” program.

Key technological innovations include:

Safeguards Compatibility: Safeguards measures help the International Atomic Energy Agency (IAEA) detect host state diversion and undeclared production of nuclear materials for weapons use. Advanced reactors can contribute to a more efficient use of safeguards resources by incorporating “safeguards-by-design” principles, enabling IAEA to maintain and improve safeguards even as nuclear energy scales to meet climate needs.

Advanced Fuels: Some advanced reactors use fuel forms that make separation of weapons material even more challenging than existing types. TRISO fuel, for example, used in some advanced reactors, is difficult to separate into its component parts and would not be a likely target for proliferation. Some reactors can even reduce government fissile material stockpiles by consuming plutonium or highly enriched uranium down-blended from weapons, similar to the Megatons to Megawatts program. Some reactor designs also reduce the fissile material available in spent fuels.

Reduced Fuel Access: Many advanced reactors have longer refueling cycles than today’s reactors, which are typically on 18-24 month cycles. Each time the reactor is refueled, there is some vulnerability to diversion of fuel, so fewer refueling outages (every seven to ten years, for example) provide fewer such opportunities. In some cases, reactor designs feature a ‘sealed core’ that is simply replaced every ten years; making it possible to avoid any fuel-handling in the host country.

Reduced Enrichment Requirements: Some advanced reactors reduce the need for uranium enrichment or reprocessing, which are the steps with the greatest proliferation risk, by using unenriched uranium, spent nuclear fuel, or thorium. Some are designed to require no reprocessing, rely primarily on depleted uranium for fuel (with some low enriched uranium for startup), and eliminate the need for enrichment entirely once the fleet is in operation.

Verification Innovations: Beyond nuclear technologies, new monitoring technologies offer enhanced methods to monitor and verify safeguards compliance. Satellite monitoring of facilities and artificial intelligence increase the capabilities of IAEA and national governments to detect any diversion of material.

All of these technological advances can be useful in the effort to reduce proliferation risk, but the benefits of creating robust international nuclear trade may yield much larger benefits. The United States and Europe were the great champions for the security architecture designed to prevent nuclear proliferation. Today however, both are waning forces in the global nuclear energy order.

#### 2] Turn: Dominance in production lets the US control uranium exports to control the risk of prolif.

DJ Nordquist, 11-1-2024, "Embracing an All-of-the-Above Strategy for Energy and Economic Development", <https://carnegieendowment.org/research/2024/10/nuclear-power-united-states-energy?lang=en> [DJ Nordquist is an advisory board member at ClearPath and a senior advisor at the Center for Strategic and International Studies. She previously served as the executive director representing the United States on the Board of Directors of the World Bank Group and chief of staff at the Council of Economic Advisers in the White House. DJ is a member of Carnegie’s taskforce on U.S. Foreign Policy for Clean Energy Supply Chains.] DOA: 4/1/2025 //RRM

Conclusion

Wind and solar power are not going to be able to provide the amount of power that energy-intensive AI will need in order to blossom—an estimated 160 percent increase in data-center power in the next six years alone.64 Unlike other tech innovations, where much of the manufacturing could be outsourced overseas (often to the detriment of the United States in the long run), AI’s physical infrastructure must be built in the United States because of economic security concerns. For that reason alone, the country needs an all-of-the-above energy strategy that includes gas, nuclear (if it can scale up), and variable renewable sources (which cannot supply enough power by themselves in any scenario). Interestingly, the Palisades Power Plant in Michigan is set to reopen after shutting down in 2022, making it the first decommissioned nuclear plant to be restarted.65 And even Three Mile Island (infamously the site of a partial meltdown in 1979), which was closed in 2019, may be put back into commission in response to the new power demands from AI.66

So while the United States is un-mothballing old nuclear plants and rarely building new ones, China is leaping ahead, thanks not only to the Chinese government’s financing and subsidies, but also through other supportive policies like streamlined permitting and fast regulatory approval (and stolen U.S. intellectual property). China has been finishing construction on plants in between five and seven years each, while the most recently constructed U.S. plant, Vogtle, took thirty years.67 The United States could learn from China’s example here.

America needs to bring supply chains stateside, including mineral extraction and processing, so that it is not dependent on adversaries for renewables and other sources of power. It must work with foreign partners who have the mineral resources the country needs and consider what their energy needs are, too. And the United States must update its outdated and cumbersome permitting processes and agency coordination for energy projects of all kinds so it can become fully energy-independent again.

The country could also use its geopolitical leverage to seek nuclear trade agreements with countries like Saudi Arabia; currently, the terms the United States has set—requiring the Saudis to forgo rights to develop fuel, which China is reportedly not requiring—are competing the United States out of a deal. The United States needs to lower the cost of nuclear fuel by reforming regulation of nuclear fuel production. If the United States is concerned about allowing partners to enrich their own nuclear fuel, which scholars consider the most significant risk of SMR supply chains with regard to nuclear non-proliferation, then the United States must be able to guarantee fuel to foreign buyers.68

However, there are fail-safes: all U.S. agreements on nuclear energy (known as 123 Agreements—negotiated by the U.S. Department of State with technical assistance from the U.S. Department of Energy and the U.S. Nuclear Regulatory Commission) explicitly require adherence to strong non-proliferation criteria. The United States and its Nuclear Regulatory Commission are widely considered to be the gold standard for nuclear safety around the world. In addition, it is worth noting that nothing prevents China from transferring enrichment technology to Saudi Arabia, so the United States refusing to do so does not guarantee that the Saudis will be unable to acquire the technology. At the end of the day, it would be more beneficial for the United States to keep the Saudis in its own sphere of influence than to push them into the arms of China or Russia.

The United States also could take advantage of its current talent base and expand it, including with better science and technology education, as well as leveraging the country’s unique economic dynamism and creativity through smart regulation to get better and safer products to the market. As it has done in other industries, the United States can outcompete China on quality if investors can confidently invest money in the nuclear technology industry. And finally, the United States could immediately leverage its burgeoning micro-reactor industry, where it has the potential to outpace China.

The path to establishing more independent and sustainable energy is clear, and it will require investment in multiple kinds of power production. Political and economic willpower will be necessary to ensure the United States has the right energy policies in place to secure the rapidly changing new technologies feeding the nation’s economic growth and prosperity.