**CT1 Private Investment**

#### **We Negate:**

#### **Contention One is Private Investment**

#### **First, Private investment ensures nuclear transition now**

***Heckler 25 [Brian Heckler "Private equity flows to advanced nuclear companies hit record high in 2024" LinkedIn Post Feb 2025] [thiele] [https://www.linkedin.com/in/brian-heckler?trk=public\_post\_feed-actor-name] [Brian Heckler is a seasoned professional with over 39 years of experience in Audit world; Head of Strategy and Development, Virtas Partners, 52 employees, based in Chicago]***

The energy demand is not slowing down any time soon and the desire for clean energy production is opening up a nuclear renaissance. Private equity investment in new technologies in advanced nuclear is helping. “Private equity transaction value in the advanced nuclear sector reached $783.3 million in 2024, 13x the 2023 total,” according to S&P Global Market Intelligence data. I think Nuclear generation is part of the solution to clean production to replace some of our natural gas baseload and leveling out variability from renewables. That’s a significant spike in funding that I've not seen in decades. It emphasizes a desire from the world to adopt viable energy systems and, at the same time, shows how private equity is going to be a catalyst in achieving that.

#### **Second, Banks and tech are financing**

***Qvist 24 [Malwina Qvist David Stearns Nuclear energy stocktake: Heading into COP29, finance lags behind ambitions Clean Air Task Force November 8, 2024] [thiele] [https://www.catf.us/2024/11/nuclear-energy-stocktake-heading-into-cop29-finance-lags-behind-ambitions/]***

The world is going to need more energy, not less. Global electricity demand is expected to grow by as much as 75% by 2050, requiring strategies that limit emissions while meeting this increased demand. Nuclear energy stands out as a critical tool in this effort—offering the promise of reliable, round-the-clock, zero-carbon electrical and thermal energy. Recognizing this potential, 22 nations committed to tripling their nuclear energy capacity by 2050 through the Net-Zero Nuclear (NZN) Initiative at COP28 in Dubai. While a sign of progress, particularly at a forum that has been slow to recognize nuclear energy’s value in addressing the climate challenge, commitments are nothing without action. As we mark the anniversary of the NZN Initiative, it’s important to evaluate what’s been accomplished to advance the promise of nuclear energy, and what still needs to happen as world leaders head to COP29 in Baku. International collaboration to scale nuclear energy continues to gain momentum In March 2024, world leaders, heads of state, and nuclear sector stakeholders gathered in Brussels for the first-ever Nuclear Energy Summit at the head of state level, organized by the International Atomic Energy Agency (IAEA) and the Belgian government. With participants from over 30 countries, mostly from Europe, the summit highlighted nuclear energy’s role in decarbonization and economic growth, signaling unprecedented interest in scaling up nuclear energy through international collaboration. Calls for innovative financial instruments to support nuclear energy projects and advocacy for an EU strategy to advance small modular reactors (SMRs) through a new EU industrial alliance underscored the urgency for action. Building on this momentum, in September 2024, delegates from the 22 member nations of the NZN pledge convened at the second Roadmaps to New Nuclear Ministerial Conference in Paris. Hosted by the Nuclear Energy Agency (NEA) and Sweden’s Ministry of Climate and Enterprise, the conference reaffirmed the pledges to triple global nuclear capacity by 2050. Participants emphasized nuclear energy’s essential role in achieving a climate-neutral future, enhancing energy security, and reducing fossil fuel reliance amid geopolitical tensions. The resulting communiqué highlighted the importance of international cooperation, advancing small modular reactors and other new technologies, and involving global financial institutions to support nuclear expansion. Private sector leaders are recognizing the advantages of nuclear energy In a major shift, the private sector—particularly the tech industry—is making significant investments in nuclear energy to meet growing demand for power. Just before Climate Week NYC, Constellation Energy announced a 20-year agreement to supply Microsoft with 835 megawatts of zero-carbon power by restarting Three Mile Island (TMI) Unit 1 in Pennsylvania. Google and Amazon soon followed with landmark agreements of their own. For Google’s part, it agreed to purchase nuclear energy from small modular reactors (SMRs) developed by Kairos Power, marking the first corporate agreement of its kind. Amazon joined the wave of support by signing agreements to back multiple new nuclear energy projects, including SMRs. Perhaps the biggest signal of shifting attitudes was the announcement from 14 major banks expressing their support for efforts to triple global nuclear energy capacity by 2050. But banks and investors are required to make risk-adjusted returns on the capital that is entrusted to them. This signal does not automatically translate into agreeable term sheets, information memoranda and transactions with drawdown approvals. Thus, incentives will be needed to unlock the significant levels of capital necessary for financing new reactors, eventually driving down costs and speeding up deployment. The announcement was just a moment; the heavy lifting for the industry and policymakers lies ahead, because mainstream finance is already very busy and has not felt any historical compulsion to support nuclear energy buildout.

#### **Third, current private investment is sufficient, additional government investment produces less reliable energy**

***Béliveau 24 [André Béliveau, written by Three Mile Island: Private Investment is Key to Expanding Nuclear Power – Not Government Subsidies Commonwealth Foundation September 20, 2024] [thiele] [https://commonwealthfoundation.org/2024/09/20/three-mile-island/]***

André Béliveau, Commonwealth Foundation’s Senior Manager of Energy Policy, issued the following statement: “The announced partnership between Constellation and Microsoft is a victory for reliable energy and market-driven solutions to secure our energy future. Refiring the closed reactor through private investment demonstrates that Pennsylvania does not need subsidies for nuclear power. The market will deliver reliable, affordable, and clean power far better than government central planning, and here is a case study demonstrating it. “Private industry knows the need for reliable energy sources to keep the grid online for the new wave of data centers powering our ever-advancing technology needs. Current progressive policy trends toward a government-forced transition away from reliable energy and advocates for handouts to achieve it. These programs—such as the Inflation Reduction Act and Gov. Josh Shapiro’s proposed Pennsylvania Reliable Energy Sustainability Standard (PRESS)—disrupt price signals in our energy markets and flood them with unreliable, weather-dependent sources. Most importantly, such government programs force ratepayers to pay more for less reliable energy, threaten high-paying jobs, and arbitrarily close reliable power plants without replacements. “Resisting handouts and tax credits and prioritizing reliable energy are fundamental principles for the Commonwealth Foundation’s energy platform. We celebrate this effort that brings private investment onboard and more reliable baseload power to the grid.” Pennsylvania has nine nuclear reactors, which produce nearly one-third of the commonwealth’s electricity. Only Illinois produces more energy from nuclear.

#### **Fourth, Government investment picks losers**

***Lesser 23 [Jonathan Lesser "Green Energy and Economic Fabulism" Report 58, The Global Warming Policy Foundation 2023] [thiele] [https://www.thegwpf.org/content/uploads/2023/12/Lesser-IRA-Subsidies.pdf] [Lesser = president of Continental Economics, an economic and energy consulting firm, an adjunct fellow with the Manhattan Institute, and a senior fellow with the Discovery Institute; BS in mathematics and economics from the University of New Mexico, and an MA and PhD in economics from the University of Washington]***

Second, government spending also can crowd out private investment. This is similar in concept to subsidized generators crowding out unsubsidized generators. Here, ‘crowding out’ refers to the adverse impacts of higher government spending on private investment. If government spending increases, but with no corre- sponding increase in total economic activity, the private sector is said to have been ‘crowded out’.53 Even increased R&D spending on green energy has been shown to crowd out private investment in more productive areas.54 Another recognized issue associated with crowding out by government spending is higher interest rates caused by deficit spending, as the US is experiencing, in part because of the trillions of dollars in subsidies promised under the Inflation Reduction Act. Deficit spending that results in higher market interest rates reduces private investment by increasing opportunity costs for private investors. Third, because subsidies increase energy costs, despite claims to the contrary, they cause a reduction in overall economic growth and jobs. For example, as shown in Table 3, the projected total of subsidies – in the form of above-market prices – paid to offshore wind developers is around $58 billion. These higher electricity prices reduce economic growth in several ways. Firstly, as seen in Europe, electricity prices can become so high as to cause deindus- trialization, because energy-intensive industries move elsewhere. The problem is particularly acute in Germany. Secondly, as elec- tricity prices increase, consumers and businesses have less money to spend on other goods and services, which leads to reduced economic growth. In previous research, I have estimated the direct employment impacts of the increased spending owing to higher electricity prices in Pennsylvania to be the loss of six job-years per million dollars.55 Hence, using the $58 billion estimate of above- market costs of electricity associated with the seven offshore wind projects, the resulting job losses would be almost 350,000 job- years, ten times larger than the number of jobs the projects claim they would create. As a result, the net economic impacts of green energy subsidies are negative, both in terms of jobs and economic output. 4. Conclusions Over the last half century, the US government’s track record of selecting ‘winning’ energy technologies has been a dismal failure. Current US and state government energy policies will be no differ- ent. The staggering amounts of money on offer through the IRA will have long-lasting and adverse consequences on energy supplies, economic growth, and the well-being of the citizenry. Federal investment tax credits, which can be as high as 60% of the costs of certain green energy projects, must be paid for. Given the country’s profligate spending and rapidly increasing deficit, for the foreseeable future, federal green energy subsidies are likely to be financed with additional debt. The financing costs alone to service that additional debt will be huge and will increase the deficit still further. As growing deficits lead to increases in interest rates, they crowd out more productive private investment. Moreover, federal spending on renewable energy itself is inefficient, rewarding low- quality resources such as wind and solar energy, rather than high- quality ones, such as nuclear power. The subsidies for these low- quality resources then crowds out spending on higher quality ones by distorting competitive markets and raising energy prices. The impacts ripple through the entire economy and further restrict economic growth and wealth creation. Moreover, higher energy prices disproportionately affect the least well off in society. Adver- tising specific green energy projects for their economic develop- ment and job creation potential may be politically appealing, but the true economic costs will be far greater. Politicians and policymakers may all choose to ignore basic economic principles in favour of political expediency and, in some cases, personal gain. However, basic economic principles will not ignore them. Eventually, the profligate spending on costly, but low- value, green energy will collapse under its own economic weight. The unanswered question is this: How high an economic and social price will the US pay for this folly before that occurs?

#### **Finally, this ensures nuclear industry collapse**

***Lesser 23 [Jonathan Lesser "Green Energy and Economic Fabulism" Report 58, The Global Warming Policy Foundation 2023] [thiele] [https://www.thegwpf.org/content/uploads/2023/12/Lesser-IRA-Subsidies.pdf] [Lesser = president of Continental Economics, an economic and energy consulting firm, an adjunct fellow with the Manhattan Institute, and a senior fellow with the Discovery Institute; BS in mathematics and economics from the University of New Mexico, and an MA and PhD in economics from the University of Washington]***

The Inflation Reduction Act (IRA) has expanded the availability of subsidies for green energy, especially investment tax credits. Over the next ten years, direct spending is estimated to be more than $1 trillion. However, given rising US deficits, much, if not all, of the tax credits for green energy, especially wind and solar, will be financed with additional debt. The resulting interest payments will add several trillion dollars to the overall cost of these subsidies. In addition to claims that these subsidies will address climate change, a primary justification for this increased spending is the idea that it will increase economic growth and provide millions of new jobs in green industries. The economic reality is far differ- ent, with the subsidized costs of these jobs far exceeding the actual salaries of workers who may be hired. For example, based on several offshore wind developers’ estimates of the numbers of jobs their projects will create, the subsidies average between $2.2 million and $2.4 million for each job per year. The staggering amounts of money made available for green energy subsidies under the IRA, far more than even was spent by the government during the Great Depression, will have long- lasting and adverse consequences on energy supplies, economic growth, and the well-being of the citizenry. Under the IRA, the subsidies on offer will continue until carbon emissions decrease by 75% below 2005 levels. Only then will they gradually decrease. Based on the Administration’s estimates of the amounts of wind and solar capacity needed to reach that goal, the investment tax credit (ITC) subsidies will total over $1 trillion, even if the infla- tion-adjusted costs of those resources fall by 40% over the next 20 years. If, instead, the inflation-adjusted costs of those resources remain constant over time, then the ITC subsidy alone would exceed $3 trillion. If US interest rates increase as the country’s deficit soars, the subsidy alone could exceed $4 trillion or more. Production tax credits for wind generation will add hundreds of billions more to these totals. The subsidies will further distort energy markets. They will crowd out more productive private investment and reduce the resources available for more efficient forms of generation, such as nuclear power, especially small modular reactors. As in Europe, the subsidies will result in higher energy prices, which will cause economic and job losses throughout the entire economy. These losses will far exceed the gains provided by the subsidies them- selves. Thus, the net economic impacts on jobs and output will be negative. Although some policymakers may choose to ignore basic economic principles in favour of political expediency and, in some cases, personal gain, those principles will not ignore them. Even- tually, the profligate spending on costly, but low-value, green energy will collapse under its own economic weight. The unan- swered question is how high an economic and social price the US will pay for this folly before that occurs.

### **CT2 Interest Rates**

#### **Contention Two is Interest Rates**

#### **Fed won’t raise interest rates now**

***Kim March 3 [Hakyung Kim "Inflation will move toward 2% target, but risks to outlook are rising, says Fed’s Musalem" CNBC March 3, 2025] [thiele] [https://www.cnbc.com/2025/03/03/inflation-will-move-toward-2percent-target-but-risks-to-outlook-are-rising-says-feds-musalem.html]***

WASHINGTON — The risks for higher inflation are on the rise, St. Louis Federal Reserve President Alberto Musalem said Monday. During a keynote address at the National Association for Business Economics conference, Musalem noted that his baseline case is for inflation to gradually move toward the central bank’s 2% target. This scenario requires inflation expectations to remain anchored and stable, he noted. However, “near-term inflation expectations have risen substantially over the last few weeks, and that’s something I’m watching closely,” Musalem added. Indeed, the February reading on The Conference Board’s consumer confidence index reflected the largest one-month drop since August 2021, as inflation expectations rise. The Institute for Supply Management’s manufacturing PMI also showed a sharp increase in prices within the sector for the month. “Businesses and households are clearly more sensitive to expectations of higher inflation,” Musalem said. “That’s why the risks seem more skewed to the upside, but the baseline is for continued disinflation.” Investors came into 2025 expecting the Fed to lower rates this year. However, the central bank kept rates at their current 4.25%-4.5% range after its January meeting, where it noted that inflation remained “somewhat elevated.” The CME Group’s FedWatch tool also shows that traders are pricing in a 93% likelihood that the Fed will keep rates at their current levels at the central bank’s March meeting. Musalem’s remarks come as investors brace for U.S. tariffs on imports from China, Mexico and Canada — with many worried the levies will drive prices higher, thus making it harder for the Fed to ease rates going forward.

#### **Federal investment increases inflation**

***Lesser 23 [Jonathan Lesser "Green Energy and Economic Fabulism" Report 58, The Global Warming Policy Foundation 2023] [thiele] [https://www.thegwpf.org/content/uploads/2023/12/Lesser-IRA-Subsidies.pdf] [Lesser = president of Continental Economics, an economic and energy consulting firm, an adjunct fellow with the Manhattan Institute, and a senior fellow with the Discovery Institute; BS in mathematics and economics from the University of New Mexico, and an MA and PhD in economics from the University of Washington]***

Second, government spending also can crowd out private investment. This is similar in concept to subsidized generators crowding out unsubsidized generators. Here, ‘crowding out’ refers to the adverse impacts of higher government spending on private investment. If government spending increases, but with no corre- sponding increase in total economic activity, the private sector is said to have been ‘crowded out’.53 Even increased R&D spending on green energy has been shown to crowd out private investment in more productive areas.54 Another recognized issue associated with crowding out by government spending is higher interest rates caused by deficit spending, as the US is experiencing, in part because of the trillions of dollars in subsidies promised under the Inflation Reduction Act. Deficit spending that results in higher market interest rates reduces private investment by increasing opportunity costs for private investors. Third, because subsidies increase energy costs, despite claims to the contrary, they cause a reduction in overall economic growth and jobs. For example, as shown in Table 3, the projected total of subsidies – in the form of above-market prices – paid to offshore wind developers is around $58 billion. These higher electricity prices reduce economic growth in several ways. Firstly, as seen in Europe, electricity prices can become so high as to cause deindus- trialization, because energy-intensive industries move elsewhere. The problem is particularly acute in Germany. Secondly, as elec- tricity prices increase, consumers and businesses have less money to spend on other goods and services, which leads to reduced economic growth. In previous research, I have estimated the direct employment impacts of the increased spending owing to higher electricity prices in Pennsylvania to be the loss of six job-years per million dollars.55 Hence, using the $58 billion estimate of above- market costs of electricity associated with the seven offshore wind projects, the resulting job losses would be almost 350,000 job- years, ten times larger than the number of jobs the projects claim they would create. As a result, the net economic impacts of green energy subsidies are negative, both in terms of jobs and economic output. 4. Conclusions Over the last half century, the US government’s track record of selecting ‘winning’ energy technologies has been a dismal failure. Current US and state government energy policies will be no differ- ent. The staggering amounts of money on offer through the IRA will have long-lasting and adverse consequences on energy supplies, economic growth, and the well-being of the citizenry. Federal investment tax credits, which can be as high as 60% of the costs of certain green energy projects, must be paid for. Given the country’s profligate spending and rapidly increasing deficit, for the foreseeable future, federal green energy subsidies are likely to be financed with additional debt. The financing costs alone to service that additional debt will be huge and will increase the deficit still further. As growing deficits lead to increases in interest rates, they crowd out more productive private investment. Moreover, federal spending on renewable energy itself is inefficient, rewarding low- quality resources such as wind and solar energy, rather than high- quality ones, such as nuclear power. The subsidies for these low- quality resources then crowds out spending on higher quality ones by distorting competitive markets and raising energy prices. The impacts ripple through the entire economy and further restrict economic growth and wealth creation. Moreover, higher energy prices disproportionately affect the least well off in society. Adver- tising specific green energy projects for their economic develop- ment and job creation potential may be politically appealing, but the true economic costs will be far greater. Politicians and policymakers may all choose to ignore basic economic principles in favour of political expediency and, in some cases, personal gain. However, basic economic principles will not ignore them. Eventually, the profligate spending on costly, but low- value, green energy will collapse under its own economic weight. The unanswered question is this: How high an economic and social price will the US pay for this folly before that occurs?

#### **Federal nuclear investment will cost trillions**

***Paraskova 24 [Tsvetana Paraskova "The West’s Nuclear Power Revival Could Be Slower Than Hoped" Yerepouni Daily News March 24, 2024] [thiele] [https://energycentral.com/news/west%E2%80%99s-nuclear-power-revival-could-be-slower-hoped] [writer for Oilprice.com with over a decade of experience writing for news outlets]***

-- At the COP28 climate summit at the end of last year, the United States and 21 other countries pledged to triple nuclear energy capacities by 2050. -- Most Western governments – with the notable exception of Germany – are now betting on nuclear power to help them with the carbon emission targets. -- The West has seen in recent years several cautionary tales of huge delays and cost overruns in looking to boost nuclear capacity. Western nations may be getting ahead of themselves in their ambition to swiftly roll out new nuclear power capacity in the current push to reduce dependence on Russian uranium and meet net-zero targets with more nuclear-generated electricity. At the COP28 climate summit at the end of last year, the United States and 21 other countries pledged to triple nuclear energy capacities by 2050, saying that incorporating more nuclear power in their energy mix is critical for achieving their net zero goals in the coming decades. The United States, alongside Britain, France, Canada, Sweden, South Korea, Ghana, and the United Arab Emirates (UAE), among others, signed the declaration at the COP28 climate summit in Dubai. “The Declaration recognizes the key role of nuclear energy in achieving global net-zero greenhouse gas emissions by 2050 and keeping the 1.5-degree Celsius goal within reach,” the U.S. Department of State said. John Kerry, President Joe Biden’s climate envoy, says there are “trillions of dollars” available that could be used for investment in nuclear energy. “We are not making the argument to anybody that this is absolutely going to be the sweeping alternative to every other energy source — no, that’s not what brings us here. But you can’t get to net-zero 2050 without some nuclear power,” he told reporters at the time. “Too Optimistic” Most Western governments – with the notable exception of Germany – are now betting on nuclear power to help them with the carbon emission targets. But many may have become too optimistic they would see a fast rollout of nuclear reactors and capacities in an industry notoriously known for years of delays and huge cost overruns.

#### **This increases inflation by 20 percent over 3 years**

***Beach 24 [William W. Beach, Is Inflation the Result of Excessive Deficit Spending? Economic Policy Innovation Center. February 9, 2024] [thiele] [https://epicforamerica.org/the-economy/is-inflation-the-result-of-excessive-deficit-spending/] [former Commissioner of Labor Statistics and head of the U.S. Bureau of Labor Statistics (BLS), Senior Fellow in Economics at the Economic Policy Innovation Center and the Coolidge Fellow at the Calvin Coolidge Presidential Foundation; BA degree from Washburn University, a master's degree from the University of Missouri in Columbia, Missouri and a PhD in economics from the University of Buckingham]***

Executive Summary The purchasing power of families has declined since inflation began in the spring of 2021. Americans saw the prices of goods and services rise much faster than their income, which produced a painful squeeze on family budgets. Who is to blame for the family budget squeeze? The answer is historically high budget deficits. The Federal government borrowed heavily to meet its spending needs in 2020 and 2021, and that borrowing was converted by the banking system into funds that fueled the rise in prices. From June 2020 through October 2023, overall prices grew by 19.7 percent, or nearly one- fifth in just three years. Food prices rose 21 percent and shelter prices increased by 19 percent. The Case-Shiller index, a sensitive metric for new and used home sale prices, increased by 43 percent. Adding up the deficits for FY2020 through FY2023 totals $8.8 trillion. Outside of wartime, no four years in U.S. history has seen deficits this large, either in nominal terms or as a percent of GDP. This infusion of trillions of deficit dollars resulted in a 25.4 percent increase in bank assets between 2020 and 2021, which banks converted into loans. Consumer loans rose by 19.2 percent, real estate loans grew by 12.1 percent, and total loans for the banking system expanded by 13.7 percent. The last time there was such a jump in lending was in the run-up to the Great Recession, 2005 and 2006. This greater supply of credit was complemented by a large increase in the money supply. Between March 2020 and April 2022, a broad measure of the money supply grew by $5.4 trillion, which was about a third of GDP during that period. Alternative explanations of inflation fail to refute the connection between funding federal deficits and rapid increases in household and business purchases. These alternative explanations of inflation include supply chain disruptions, price gouging, and the arguments of Modern Monetary Theory.

***Card continues***

Economics, unlike physics, is not an exact science. We need always to be open to unique circumstances and unexpected results. That said, theory, history, and recent events point very clearly to a powerful nexus between excessive and sustained deficit spending and rapid increases in overall prices. This record also points to the responsibility that policymakers uniquely bear for worsening living conditions and for widespread pessimism about the economic future among the citizens they serve. High and sustained inflation undermines the economic and social fabric of a country, and will continue to do so in a predictable fashion if policymakers count their political aspirations facilitated by higher spending as more important than the goals and living standards of their constituents. When that happens, just as predictably, voters will find fault with these same policymakers and demand change through political or other means.

#### **Inflation increases interest rates**

***Hansen January 3 [Sarah Hansen "Will the Fed Raise Interest Rates in 2025?" Morningstar Jan 3, 2025] [thiele] [https://www.morningstar.com/markets/will-fed-raise-interest-rates-2025] [senior reporter for Morningstar]***

Are Rate Hikes on the Table? As questions about the path of Fed policy continue to circulate, some market watchers are even floating the idea that the central bank might raise rates in 2025—especially since growth is expected to be strong next year, and some of the incoming Trump administration’s potential policies are likely to exacerbate inflation. Rissmiller doesn’t see this as likely. He says that to consider raising rates, central bankers would need more confidence that the unemployment rate will stop rising. “That’s the missing variable.” He explains that a small uptick in unemployment would bring the unemployment rate up to 4.3%—a new high in this cycle. He adds that considerable research shows that once the unemployment rate starts rising, it tends to keep going. That would be bad news for the Fed, which has been adamant that it does not want to damage the labor market as it fights to bring inflation back to target. Hallam says that while rate hikes in 2025 are not impossible, they are also far from his central case. “As long as the Fed can still have reasonable confidence the policy is restrictive, and that in the medium term, inflation will head toward 2%, their bias will be neutral to easing,” he explains.

#### **Unexpected interest rate hikes crash developing economies.**

**Li 24**, Jiangsu Ocean University, China. (Xinru, “The Effect of the Fed Interest Rate Hikes on the Financial Crisis Evidence from Emerging Market Economices,’ *Asian Journal of Economics, Business and Accounting*, https://doi.org/10.9734/ajeba/2024/v24i61355) \*\*figures omitted.

3. FED RATE **HIKES** AND THE CAUSES OF **FINANCIAL CRISES IN EMERGING COUNTRIES**

Historically, the Fed's tightening cycles have often been accompanied by **severe turbulence** in international financial markets, **especially** for those emerging economies located in Asia, Africa and Latin America, where the impact has been **particularly far-reaching** and heavy. Since 1982 to 2021, the Federal Reserve has implemented five rounds of monetary tightening policy, this period of the global scope of the five successive financial crises or financial turmoil, **fully demonstrated** the international transmissioneffect of monetary policy.

The Latin American debt crisis of 1982 was a **notable** case of international financial market volatility under the Fed's austerity policies, with emerging countries falling into difficulties as a result of capital outflows and steeply rising debt servicing pressures [7]. Subsequently, the "Black Monday" stock market crash in 1987 once again highlighted the fragility of global financial markets[8]. In the 1990s, the Asian economic crisis of 1997[9] and the Russian debt crisis of 1998[10] dealt a **severe blow** to emerging markets in the Fed's tightening cycle, while the bursting of the US Internet bubble in 2000[11], although it started in developed countries, had a global impact, and emerging countries were not spared.

After entering the 21st century, the US sub-prime mortgage crisis in 2007 [12,13] rapidly evolved into the global economic crisis of 2008[14], in which emerging countries suffered tremendous pressure on exchange rates and capital flows. The subsequent European debt crisis, although mainly in Europe, but its negative impact on the global financial markets can not be ignored, emerging countries are also facing capital outflows and financial market turbulence [15]. In the near future, the Turkish currency crisis in 2019 [16] and the global stock market crash in 2020 have once again reminded us that the impact of the Fed's monetary policy adjustments on emerging countries' financial markets remains significant. This paper will focus on the first, third and fifth rounds of financial crises closely related to the financial crises in emerging countries, and analyse in depth the background of their occurrence, the transmission mechanism, and the impact on the economic and financial stability of emerging countries, with a view to providing useful references for future policy formulation and risk prevention [17].1 3.1 The First Round of Interest Rate Hikes and the Latin American Crisis Under the shadow of the stagflation crisis of the 1970s, the United States population suffered from economic hardship. At the same time, the three Latin American countries, with their rich natural resources, especially oil and commodities, were able to develop their economies rapidly, fuelled by soaring export prices. However, the good times did not last long. 1979, Paul Volcker became chairman of the Federal Reserve, adopted an aggressive monetary policy, the Federal Funds Rate pushed up to more than 11 per cent, and then even more in 1981 to a staggering 16 per cent. This move put heavy pressure on the markets and the US economy plunged into its darkest period since the Great Depression in 1982. During this period, in addition to soaring interest rates, investment, consumption, the stock market, real estate, employment and wage levels all showed a downward trend. To add insult to injury, the rapid fall in energy prices in 1982 dealt a heavy blow to the three Latin American countries that depended on resource exports. As these countries adopted a fixed exchange rate system, the appreciation of the US dollar was accompanied by a passive appreciation of their own currencies, leading to a massive sell-off of their currencies. The government had to use its foreign exchange reserves to stabilise its currency. However, when Mexico's foreign exchange reserves were approaching the danger line, the government was unable to repay its due US dollar foreign debt, and was eventually forced to close down the foreign exchange market and declare a default on its sovereign debt. This event triggered a chain reaction, Brazil, Argentina, Chile, Peru, Venezuela and other Latin American countries have been plunged into bankruptcy, Latin American sovereign debt crisis in full swing. This financial crisis not only put an end to the rising momentum of emerging countries, but also pushed Argentina, Brazil, Mexico and other countries into the middle-income trap, causing them to repeatedly fall into crisis in the following years. At the same time, it also became a historical precedent for emerging countries to be prone to thunder when the Fed raises interest rates [18]. 3.2 The Third Round of Interest Rate Hikes and the Southeast Asian and Russian Financial Crises In 1994, the Federal Reserve initiated a new cycle of interest rate increases and the federal funds rate climbed rapidly, rising sharply from 0.5 per cent to a level of about 6 per cent. This interest rate level then remained stable for several years, reflecting the strong growth momentum of the United States economy. During this period, the U.S. economy was booming and market confidence was high, fuelling the continued appreciation of the U.S. dollar [19]. At the same time, President Clinton actively promoted the introduction of the Financial Hybridisation Act, a move that provided investment banks with broader business space and further contributed to the prosperity of the financial market. In addition, the Clinton administration also announced the opening of the Internet to civilian use, an innovative initiative that opened new doors for technological innovation and capital flows on a global scale. The implementation of these two policies attracted a large amount of international capital from emerging markets back to the United States, investing in financial securities and Silicon Valley innovation enterprises, further promoting the prosperity of the U.S. economy. However, this prosperity did not last long. 2 July 1997, the Thai government announced the abandonment of the fixed exchange rate system, resulting in a sharp depreciation of 17% of the Thai baht against the U.S. dollar, which triggered a panic in the financial markets. Subsequently, international capital began to frantically short the currencies of Asian countries such as the Philippine peso and the Indonesian rupiah, resulting in the almost total loss of these countries' currencies. The Asian financial crisis broke out in full force, with far-reaching effects on the global economy. During this crisis, although the Chinese market retained the stability of the Hong Kong dollar, the stock market and property market suffered a heavy blow, with their market values shrinking drastically. In 1998, the risk of the financial crisis in Southeast Asia spread further to Russia, leading to the country's announcement of a sovereign debt default, and the rouble plummeted by 70% in a single day in September of that year. The crisis not only put an end to the Asian economic miracle, but also had a far-reaching impact on the global economic landscape, triggering a profound rethinking of the stability of the global economic and financial system [20]. 3.3 The Fifth Round of Interest Rate Hikes and a Series of Exchange Rate Turmoil in Emerging Countries The 2008's year global economic crisis led to a major global central bank bailout, with the Federal Reserve continuing its seven-year-long easing policy, with the federal funds rate even dropping to near zero. It was not until 2016 that the Fed began to raise interest rates, although this time the rate hike was very slow, but the same situation happened again, in this rate hike, a series of new market economies began to have exchange rate turbulence, Argentina, Russia, Turkey's currency depreciated sharply. In the second half of 2018, the Fed raised interest rates at a faster pace, and the U.S. stock market almost collapsed, and since then, Turkey erupted into a financial crisis, and suffered a triple killing of stocks, bonds and exchange rates [21].

4. ANALYSIS OF THE RELATIONSHIP

4.1 Influence of the Dollar on the Economy

With five interest rate hikes by the Federal Reserve, five financial **crises** have **erupted globally**, and the Fed is able to make **waves**in the global market because the **US dollar is the world's currency**. In the past four decades, the international status of the US House of Representatives has been very solid. Today, the U.S. economy accounts for **1/4** of the world's total economic volume, the dollar in the global foreign exchange reserves accounted for **60 per cent**, in international settlements accounted for **80 per cent**, that is to say, in today's international currency market, the U.S. dollar is almost the **only** currency **supplier**, the Federal Reserve **firmly in control of**the pricing power of global currencies. Every time the dollar easing period, the dollar index will fall some, but in the tightening cycle and rebound back, the dollar excessive easing, the global diffusion; the dollar excessive tightening, the global shortage of water, can be seen in the dominance of the dollar. The belief by some that the Fed is reaping the rewards by operating in an easing-tightening cycle has not yet been confirmed. While the Fed assesses **global** financial **stability**, the Fed's monetary policy serves itself to **the national market** rather than the **international market**, with the goal of achieving full employment and controlling inflation **in the country**. Secondly, the dominance of the US dollar in the international currency market is actually the result of rational choices made by governments, investors, businesses, and individuals, such as the Turks who prefer to give up their local currency to hold US dollars, and the central banks of Japan, China, and Saudi Arabia who stockpile large amounts of US dollars to issue their own currencies. And we can also see that four of the five financial crises that erupted after the Fed raised interest rates occurred in the United States. Two stock market crashes, a bubble crisis, a debt crisis, does this mean that the Fed rate hikes to the global punishment or reward is indiscriminate? But excluding the United States, the financial crises during the Fed's tightening period hit emerging countries much harder than developed countries; for example, the Latin American sovereign debt crisis of 1982 pushed Latin American countries into the middle-income trap; and the Asian financial crisis of 1997 put an end to the Asian growth miracle.

4.2 The Path of the Dollar's Impact on the Economy of Emerging Countries

First, interest rate hikes by the Federal Reserve tend to lead to **change**s in **global capital flows**. As United States Treasury yields rise, capital may be more inclined to flow to the United States, leading to capital **outflows** from emerging markets. This is a huge challenge for countries that have **gaps** in their fiscal and monetary policies. It reveals that emerging countries need to **strengthen**their own macroeconomic management and the maturity of their financial markets to cope with the uncertainty caused by external capital flows.

Second, capital outflows may lead to **currency depreciation** in emerging countries, which in turn puts **pressure on economic growth**. In order to stabilise their exchange rates, these countries may need to adopt **tighter** monetary **policies** or capital control **measures**, but this often comes at the **expense** of economic growth. This reveals that emerging countries need to find a balance between maintaining exchange rate stability and promoting economic growth, which may need to be achieved by deepening structural reforms and enhancing industrial competitiveness.

In addition, the Fed's interest rate hike may also **increase** the debt burden of emerging countries. Debt-servicing pressure on these countries may further **increase** due to rising borrowing costs. This reveals that emerging countries need to **prudently manage** their external **debt**, and reduce debt-servicing pressure by optimising debt structure and reducing debt costs.

At the same time, the Fed's interest rate hike may also **trigger volatility in global financial markets**, especially for those emerging market countries with close ties to the U.S. stock market and economy. This requires emerging countries to strengthen financial regulation and improve the robustness of their financial systems to **cope** with external shocks.

Dollar interest rate hikes affect the economy of emerging countries generally have four paths: 1. external debt path: when the dollar interest rate hikes, hold a large number of U.S. dollar debt of the government, corporate debt servicing costs directly increased resulting in external debt mine, Mexico in 1982, Argentina belongs to this situation, and now China Evergrande and other large-scale real estate is also faced with U.S. dollar debt defaults; 2. exchange rate path: the U.S. dollar interest rate hikes, the depreciation of the national currency, resulting in a **large** amount of capital outflow domestic real estate bubble collapse, the risk passed to commercial banks triggering systemic financial risks. A large amount of capital outflow domestic real estate bubble collapse, the cost of foreign debt service to **further increase** and mine, the risk of transmission to commercial banks triggered systemic financial risk, emerging countries are very dependent on foreign capital, capital flight is disastrous, the 1997 Asian financial crisis belongs to this situation; 3. **Inflation** path: the dollar hikes in interest rates, the local currency **depreciated sharply**, suffered a **credit crisis**, the people **sell** their currency to avoid risk, triggering **Inflation**, although the depreciation of the local currency will be conducive to exports, but like today's emerging countries in Turkey, Russia, a large number of commodities, technology dependent on imports, the depreciation of the local currency led to a **large increase in the cost of imports**, which further **pushed up** the price of commodities.4. Path of interest rate hikes: the dollar hiked interest rates, followed by the hike in interest rates of the emerging countries does not necessarily defuse the risk, depending on the specific country's economic strength, if the country's economic strength is strong, Government and corporate liabilities are low, cash flow is sufficient, financial assets and real estate bubble is small, that follow the dollar together with the interest rate hike is effective, for example, robust Germany's ability to resist risk is very strong, the financial crisis in 2008, cash flow is sufficient for the German Volkswagen reverse takeover is collecting their own Porsche company; but if the country's economic strength is weak, the government, business, household liabilities are high, asset bubbles, follow the The consequence of the US dollar interest rate hike is that the **debt burden** of the country also **increases**, enterprise and household consumption **shrinks**, and a **debt crisis** and **asset bubble crisis** may **break out**, and **the financial system** and the real economy **suffer a full impact**. Usually, Japan, the United Kingdom, Canada, Australia and the euro area have strong economic strength, it is easier to keep up with the Fed's pace, in contrast, emerging countries such as **Brazil, Mexico, Argentina, Thailand, Turkey**and other emerging countries **are not strong enough**, it will be **difficult to withstand the financial risks caused** by the Fed's interest rate hikes, for example, the economic growth of Latin American countries in the 1970s, the Russian economy in the first decade of the 21st century have benefited from the rise in energy prices and energy exports. Rising energy prices and energy exports of foreign exchange dividends, rather than technological progress, when energy prices fall back, economic growth came to an abrupt end, coupled with the Federal Reserve interest rate hikes, the **immediate outbreak of the debt crisis**, the same situation there are relying on the accumulation of foreign capital rather than the accumulation of technology in the 90's Asian economic growth, when the Federal Reserve interest rate hikes, the withdrawal of foreign capital from Asia, Asia on the outbreak of the financial crisis. To sum up, the Fed raised interest rates, the global tightening cycle, whether the outbreak of financial crises, depending on the Fed's tightening efforts and their own economic strength.

#### **Extinction.**

**Wong 22**, \*MPH Candidate @ Johns Hopkins, computer engineer. \*\*altruism writer. (Ruth and Evee, “Rethinking longtermism and global development,” https://sunyshore.substack.com/p/rethinking-longtermism-and-global)

Global development is important for the long-term future

In an EA Forum post, Beckstead defines three types of benefits that an intervention can have: proximate benefits, benefits from speeding up development, and trajectory changes. Global development would have immediate benefits for people alive today: economic development in low-income countries means that fewer people would experience poverty, illness, hunger, and violence. Speeding up development is speeding up the process by which countries become high-income, so it would ensure that people realize these benefits sooner.

But most of the benefits of global development are through trajectory changes that affect the long-term future. We argue that global development creates significant long-term benefits through this route. Global development can also lead to trajectory changes in the global political environment that would not happen if the development timeline were slowed down, since such changes can be locked in over time.

Global development increases diversity in global governance

One of the main ways global development benefits the far future is through its impact on diversity and inclusion in world institutions. As countries get **richer**, their people get better educated and thus better placed to **participate in institutions** with great decision-making power over the world, such as multinational corporations, governments, and international organizations. Increasing the diversity of decision makers inglobal institutions improves the **quality of world governance**, which enables humanity to better **navigate existential risks** and other global challenges.

Diversity in global institutions improves their efficacy in two ways. First, socially **diverse groups** outperform homogeneous groups at decision-making because they **deliberate more carefully** and pay more attention to facts. They also **innovate more** because diverse group members bring **unique perspectives**.3 Second, it improves value alignment between these institutions and humanity as a whole. It has been proposed that humanity should engage in a “long reflection” to decide what is ultimately of value before making potentially irreversible decisions regarding its future. For such decisions to reflect the values and needs of all of humanity, as many people as possible should be able to participate meaningfully in the global institutions making these decisions.

Currently, about 689 million of the 8 billion people worldwide live in **extreme poverty**, and they cannot participate meaningfully in world governance as long as their basic needs are not met.4 2.9 billion people lack **Internet access**, which is an important communication channel through which people make their voices heard on global issues and influence global institutions. Internet adoption is uneven across social groups: for example, women, people in rural areas, and people over age 25 are less likely to have Internet access. These disparities are especially pronounced in the 46 UN-designated Least Developed Countries (LDCs).5

Another barrier to diversity in global governance is the structure of institutions such as the United Nations, which is not designed to represent the general will of humanity. UN institutions represent the will of states—especially the five permanent members of the UN Security Council: the United States, the United Kingdom, France, Russia, and China. Although a diverse group of countries have voices in the UN, their citizens do not, especially in the case of authoritarian states.

Global development **reduces existential risks**

Another important way in which global development improves the long-term future is by reducing existential risks, particularly risks from **pandemics** andpolitical **instability**. 80,000 Hours estimates that the risk of a biological existential catastrophe in the next 100 years is about 1 in 1000.6 Poverty makes communities more susceptible to **spreading** infectious **diseases**. For example, a study of Monrovia, Liberia, in 2014 found that people living in slums who caught the Ebola virus spread it to an average of 3.5 times more people than people living in rich neighborhoods. This is because these neighborhoods are overcrowded, contaminated, and lacking in sanitation and health care infrastructure.7 Also, malnutrition weakens the **immune systems** of poor people, thereby making them more vulnerable to disease.8 Raising national **income** improves population health and enables countries to invest more in public **health infrastructure**, which makes populations more **resilient to** potentially **catastrophic pandemics**.

Global poverty also causes existential risk through its negative effects on **international security**. Many developing countries, particularly weak states, are caught in a **vicious cycle** of **poverty**, corruption, and political **instability**: “Inept, corrupt, or weak governance fosters **poverty**; widespread poverty makes **effective**, equitable **governance** **more difficult** to achieve; and when weak governments fail to improve their people’s lives, their legitimacy suffers.” Weak states often **engender terrorism** and **crime** because they are unable to maintain law and order in their territories.9

### **CT3 Politics**

#### **Tax cuts pass now.**

**Freking ‘4-11** [Kevin, Reporter for WDSU News, “Now That They’ve Passed a Budget Plan, the Hard Part Begins for Republicans.” WDSU, 11 Apr. 2025,[www.wdsu.com/article/republicans-budget-tax-cuts-challenges/64456119](http://www.wdsu.com/article/republicans-budget-tax-cuts-challenges/64456119)

[//neev](http://www.wdsu.com/article/republicans-budget-tax-cuts-challenges/64456119.%5d/neev)

“The American people are counting on us,” Johnson said. Rep. Tom Cole, R-Okla., said he's confident a final bill will pass with the House winning the most important tussles on the scope of taxes and spending cuts. “I will bet you they will fold rather than inflict the largest tax increase in American history on their voters,” Cole said of the Senate. “And two-thirds of them, with all due respect, aren’t on the ballot next time. ... Whereas everyone here is on the line. And our majority is much more on the line that their majority is."

#### **Nuclear energy investment drains PC.**

Jerome a **Paris**, August 22, 20**24**, “Why fans of nuclear are a problem today” <https://jeromeaparis.substack.com/p/why-fans-of-nuclear-are-a-problem>

Nuclear energy has been great. In many places, it has produced relatively cheap electricity and (although we did not care about that when it was built) it is largely carbon-free. It still works, but it is simply no longer competitive against available alternatives, and it is going to be increasingly difficult to integrate in a system that is inexorably dominated by solar energy during the day and other renewables. (see for instance this recent academic study). In any case, it is not financeable, and given the large amounts required for each plant, they will struggle to get built, even with large-scale state support. If a few nuclear plants could easily be built on budget and on time in a given system, it would not be an issue, but the problem is that (i) a lot of the energy of its proponents is directed at maligning renewable energy, presenting it as unserious and insufficient (arguments of the “you can’t do vital surgery if there’s no wind” type which ignore how grids work), and (ii) more importantly, nuclear swallows an incredible volume of political capital that could better be used for other purposes, like energy efficiency, upgrading the grid or reducing fossil fuel use outside the electricity sector. Politicians like these very large, multi-billion-euro projects that seem to solve an issue in one go, and can be forcefully and visibly decided by a handful of large-ego persons like themselves. They don’t understand (or hate) the very decentralized and uncontrollable nature of renewable energy systems, that require complex rules and don’t give them the same publicisable impact on things. Nuclear provides a concentrated nexus of jobs, TV opportunities, and VIP meetings with big stakes. So they are easily convinced by proponents that this is what is needed. And thus we get endlessly repeating “decisions” to build new nuclear plants, to be executed over the next 20 or 40 years, and which increasingly resemble fusion energy - always 20 years away. This is because the underlying arithmetic unfortunately no longer works, and nobody is actually willing to sink the billions, or pay the inflated tariffs, that are required to get the plants of the ground - and that’s before delays and cost overruns hit (and obviously nobody sane will agree to be responsible for these in advance).

#### **Political capital necessary for tax cuts**

**Neiffer ‘3-24** [Paul, Journalist for AgWeb, How Your Income Taxes Will Change This Year. 24 Mar. 2025, https://www.agweb.com/news/business/taxes-and-finance/how-your-income-taxes-will-change-year]//neev+thiele

The Trump tax cuts, officially known as the Tax Cuts and Jobs Act (TCJA) of 2017, have been a topic of significant debate since their inception. It appears the Republicans might have enough political capital to both extend the TCJA and enact additional tax cuts that could help farmers.

#### **Passage is key to biotech innovation.**

Sullivan ‘24, Editor of Policy and Medicine, Senior Vice President at Clinical Education Alliance (CEA) a leading continuing education provider, Founder and director of CME Coalition, a lobbying and education organization for CE providers and supporters (Thomas, “What a Trump Presidency Could Mean for the Life Sciences Industry.” *Policy & Medicine*, https://www.policymed.com/2024/11/what-a-trump-presidency-could-mean-for-the-life-sciences-industry.html)

With Donald Trump now confirmed as the President-elect, the *life sciences* *industry* is bracing for significant policy shifts that could impact everything from drug pricing to regulatory practices. Trump’s previous term may offer clues about his likely approach to healthcare, Food and Drug Administration (FDA) regulations, and trade policies, all of which hold meaningful implications for pharmaceutical companies, *biotech* firms, and healthcare providers. Below, we explore key areas of potential change and how the life sciences sector might adapt to a new Trump administration.

FDA and Accelerated Approvals

During his prior administration, Trump championed a faster and more flexible FDA approval process, prioritizing efficiency in getting new therapies to market. His leadership saw the FDA streamline approvals, especially for innovative treatments and emergency authorizations, as witnessed during the COVID-19 pandemic.

With Trump back in office, we may see a renewed push for even faster approval pathways, which could benefit companies developing breakthrough therapies, particularly in oncology, rare diseases, and gene therapy. However, an increased emphasis on speed may also heighten public and clinical scrutiny of drug safety, potentially challenging industry perceptions.

Drug Pricing and Reimbursement Policies

A central focus of Trump’s healthcare agenda has been the reduction of drug prices. His previous Most Favored Nation rule aimed to link United States drug prices to those in lower-cost countries, though it faced legal roadblocks and was ultimately suspended. Trump has already stated that he no longer sees the need for this policy.

Even still, the life sciences industry can expect heightened pressure on pricing transparency and accountability. Medicare price negotiations could be re-evaluated, with implications for reimbursement rates and market strategies. Companies may need to brace for increased regulatory oversight on pricing practices and consider how transparency measures could affect both reputation and revenue.

Domestic Manufacturing and Supply Chain Security

Trump’s “America First” policy has historically promoted domestic *manufacturing*, particularly in critical sectors, such as *pharmaceuticals*. His previous administration encouraged *reshoring* *pharmaceutical* *production* to decrease reliance on *international supply chains*, especially from countries like China and India.

For the *life sciences sector*, Trump’s presidency may lead to *new incentives* for U.S.-based *manufacturing*. *Tax breaks* or other financial encouragement may be offered to companies that *choose* to *relocate production* to the *U*nited *S*tates. While this push could support domestic industry growth, it also brings potential supply chain challenges and cost increases, as well as possible regulatory pressures to balance safety and economic factors.

Trump’s priorities to fix the Affordable Care Act (ACA) mark a significant shift in the healthcare landscape. His return to office may bring renewed efforts to modify or repeal certain ACA provisions, including allowing states greater flexibilities in defining essential health benefits, limiting the individual and employer mandates, and reducing spending on Medicaid block grants. These changes may have a potential impact on reimbursement for life sciences products.

Changes to the ACA or Medicare structure could alter reimbursement frameworks and patient access. Companies in the life sciences field, especially those with high-cost therapies, may see shifts in coverage dynamics and will need to closely monitor how policy adjustments impact patient access to innovative treatments.

Tax Policy and R&D Investment

Trump’s first term was marked by corporate tax cuts and incentives for research and development (R&D), which spurred growth in the *life sciences* and *biotech sectors*. His tax policy favored investments in R&D, leading to *increased* *innovation* and industry growth.

As President-elect, Trump is expected to continue these pro-business *tax policies*, with possible further reductions in *corporate taxes* and *expanded R&D tax credits*. This approach could provide a favorable environment for investment, especially for early-stage *biotech firms* and venture capital in the *life sciences sector*. However, balancing these incentives with overall economic health and addressing potential fiscal concerns will be key.

#### **Disease AND bioterror cause extinction absent bio-pharma innovation.**

Larsen ‘20, Senior Advisor, Copenhagen Institute for Futures Studies. *et al*. (Nicklas, 6-25-2020, "Future pandemics: A growing existential risk", *Medium*, https://medium.com/copenhagen-institute-for-futures-studies/future-pandemics-a-growing-existential-risk-9c08f3d5358e)

We have entered the era of global risks that stem from both man-made and natural sources, or a combination of both: climate change, a malevolent super AI, nuclear bombs, *bioterrorism*, cyber-attacks and, of course, *pandemics*. To further add to this complexity, there are distinctions to make in this global risk landscape. A global catastrophic risk is a hypothetical future event that could harm human well-being on a global scale, even endangering or destroying modern civilisation, whereas an event that possibly could lead to *human extinction* is an existential risk, as the Swedish author and philosopher Nick Bostrom defines it: ‘One where an adverse outcome would either annihilate Earth-originating intelligent life or permanently and drastically curtail its potential’.

While some of these existential risks stem from nature and are thus out of our control — asteroid impacts or super volcanoes for example — other threats facing us are man-made. Throughout history, human ingenuity has produced technologies with *double-edged capabilities*. Perhaps the most dramatic example came with the capability to harness the atom, with nuclear power and nuclear weapons being the by-products. This marked the dawn of a new epoch in which humankind achieved the ability to destroy itself, with a few very close calls happening especially during the Cold War. Since then, nuclear weapons have now been joined by other emerging technological risks such as nanotechnology and AI.

THE EXPANDED RISK LANDSCAPE OF PANDEMICS

Although it has been a novel experience for most people living through it, the COVID-19 pandemic was *not* an *unanticipated* event. In fact, a respiratory virus-enabled pandemic like COVID-19 was deemed likely or even expected by virologists. The *interconnectedness* of modern-day civilisation has made it *much easier for a pandemic to spread* globally in days or weeks rather than months, and the frequency of outbreaks is accelerated by ecosystem collapse, demographic developments and global warming. In any given month, The World Health Organization now traces roughly *7.000 signals* of *potential outbreaks*, conducts 300 follow-ups, and leads 30 investigations. In the month of June 2018, for the first time ever, the WHO tracked outbreaks of six of the eight of the ’priority communicable diseases’, like Zika and MERS happening at the same time. WHO’s list of potential outbreaks also includes ‘Disease X’, representing the fact that a *future epidemic* or *pandemic* could also be caused by a pathogen *unknown* to us at the current time. Below, we take a closer look at some of the global trends that will *accelerate the emergence* and *spread of disease* in the future.

The rise of megacities

The transition from rural to urban life is a defining characteristic of our age. By 2050, two-thirds of the world’s 9,8 billion people will live in urban areas, up from around half of the world population living in cities today. This movement of people from the countryside to cities is driven by the promise of increased economic opportunity, access to healthcare, connections, education, and increased mobility. During the next decade, the number of *megacities* (defined as 10 million inhabitants or more) will increase to 39 by adding Chicago, Bogota, Luanda, Chennai, Baghdad, and Dar es Salaam to the list. With more than 80% being in low- or middle-income countries, *megacities* with large parts of the populations living in slums *heightens the risk* of disease *spreading effortlessly*. Novel outbreaks will have fertile ground for spreading *exponentially*, as seen in *metropoles* and *travel hubs* of today like New York City. The megacities of the future will be *densely populated* hubs for transnational commerce, mobility, and *hyper-connected* which all *amplify pandemic risk*. With the growing risk of pandemics occurring in the future, the need to bolster the pandemic resilience of cities will only get more pressing. Researchers at the Senseable City Lab at MIT offer a glimpse into some of the features of the pandemic-proof city of the future. As part of their project named ‘Underworlds’, they placed sensors in sewers to detect concentrations of illegal drugs and harmful bacteria in specific areas. The researchers propose to develop a new kind of human health census by sampling the ‘urban gut’ and thus providing early signals of things like contagious disease with geographical precision. A city built with lessons from pandemics might be filled with systems such as these to help map the spread of disease. While technology can get us some of the way, it can’t solve some of the more structural issues that lie at the heart of why and how outbreaks of disease become epidemics or pandemics. Outbreaks of disease tend to hit underprivileged or marginalised population groups the hardest, and to effectively curb the spread of disease in the future, we not only need to expand our urban and technological resilience, but arguably (and chiefly) our social and community resilience as well.

Global warming and increased human-wildlife interfacing

Pandemics and global warming remind us that nature is powerful, and that despite all our modern gadgets, we are still subject to its temperaments. Our current situation is a terrifying harbinger of the pandemics that can be brought about in the future if global warming continues to further destabilise the natural world. Already today, global warming is *exposing new threats*. The warming planet is melting *permafrost* that has been frozen for decades or longer, *releasing ancient viruses* and *bacteria* that have lain dormant. Out of the meltwater, smallpox or the Spanish flu could be given a second chance, or something completely different we do not want to discover could be ‘released’ into the world. Rising global temperatures are also expanding the *geographical reach* of diseases like zika, dengue fever, and malaria, as these *infectious diseases* and their *vectors*, like mosquitos, *thrive* better in a *warmer* and a more humid *climate*. Additionally, global warming is also changing the water cycle, leading to heavier rainfalls and higher risks of floods, and consequently spreading water-borne diseases like cholera. This is especially problematic in the world’s poorest regions which are unable to invest heavily in climate mitigation infrastructure.

COVID-19 breached natural boundaries at the interface between human activity and wild ecosystems. A major factor driving such *spillover events* is the loss of *natural ‘buffers’* between humans and wild ecosystems, exemplified through *deforestation*, bushmeat hunting, and the traditional Asian open wet markets. Additionally, the world’s growing demand for domesticated meat is greatly increasing the number of pigs and chickens on the planet, *increasing the chances* of a pig or avian influenza to *make the jump* from *animals* to *humans*.

Democratisation and proliferation of biotechnology

In the past two centuries, we went from discovering the world of microbes invisible to the human eye to growing them in petri dishes, sequencing their genomes and now, altering their DNA. Just in the past 10 years, we have seen *major breakthroughs* in our *biotech*nological capabilities, such as the use of *gene drives*, the genetic cut-and-paste tool *CRISPR*-Cas9, and the world’s first genetically modified babies. A gene drive is a genetic mechanism by which a desired genetic sequence can be spread through a population faster than traditional inheritance.

This strategy can be so effective that traits can spread even if they result in a disadvantageous trait, such as sterility. Thus, gene drives present potential new solutions for a variety of issues facing humanity, including eradicating, or altering disease carriers such as mosquitoes and controlling invasive species of plants, insects, or toads. What is worrisome, however, is that these biotechnological breakthroughs are not only in the hands of state actors and institutions. The rapid democratisation of biotech has made these powerful tools increasingly available to groups from the undergraduate biologist to the DIY biohacking communities.

When the first human genome was sequenced in 2001, it took almost 15 years and the cost was around $2,6 billion. Today, a genome can be sequenced in an hour for a price of less than $1.000. While our growing biotechnological knowledge has benefits, it is a double-edged sword and can be misused — intentionally or unintentionally — in ways that can cause great harm. As the number of people with access to the technology grows, so does the risk for the technologies to be *misapplied* with *deadly* and global *impact*.

Error or terror: bad bugs or bad guys?

A biotechnological catastrophe may be caused by an engineered organism being accidentally released from controlled research environments, by the planned release of such an organism which then turns out to have unforeseen and catastrophic interactions with ecosystems, or by intentional usage of biological agents in biological warfare or bioterrorism attacks. The existential risks posed by most scientific and medical research is negligible. However, there is ongoing research into live agents of smallpox, SARS, H5N1, and avian flu, which, if escaped mistakenly, could wreak havoc. It is likely possible to engineer pathogens that are even more dangerous than the natural strains by increasing their incubation time, transmissibility, lethality, or resistance to vaccination and treatment. Research by well-intentioned actors into potential pathogens of pandemic, both natural — and down the road synthetic — is a path society can pursue to try to *stay one step ahead of bad actors* by exploring the space of possibilities and prepare adequately. Engineering pathogens to study them of course comes with its own set of dangers, but the *benefits to resiliency might outweigh the risks* and thus presents a fine line to be walked by the scientific community and its regulators. The technological means to genetically modify pathogenic characteristics are likely to become more widely available in the future. The main candidate for *biological existential risk* in the coming decades thus stems from our own technology and particularly the risk of *misuse* by groups or even individuals. Capabilities that were once only in the hands of governments and universities are increasingly moving into the living rooms and garages of individuals. Nick Bostrom from The Oxford Future of Humanity Institute estimates from a survey among researchers a 5% probability of a pandemic of catastrophic proportions (1 billion deaths) from natural sources by 2100 and estimate a 10% probability from an engineered pandemic.