We Negate Resolved: The United States federal government should substantially increase its investment in domestic nuclear energy.

Our First Contention is Preventing the Next Fukushima

New reactors are uniquely vulnerable to terrorism and accidents

Lyman '24 (Ed Lyman [Edwin Lyman is an internationally recognized expert on nuclear proliferation and nuclear terrorism as well as nuclear power safety and security. He is a member of the Institute of Nuclear Materials Management, and has testified numerous times before Congress and the Nuclear Regulatory Commission.], "Five Things the 'Nuclear Bros' Don't Want You to Know About Small Modular Reactors," Equation, 4-30-2024, https://blog.ucs.org/edwin-lyman/five-things-the-nuclear-bros-dont-want-you-to-know-about-small-modular-reactors/)//Shwillett

2. SMRs are not generally safer or more secure than large light-water reactors. Because of their size, you might think that small nuclear reactors pose lower risks to public health and the environment than large reactors. After all, the amount of radioactive material in the core and available to be released in an accident is smaller. And smaller reactors produce heat at lower rates than large reactors, which could make them easier to cool during an accident, perhaps even by passive means—that is, without the need for electrically powered coolant pumps or operator actions. However, the so-called **passive** safety features that SMR proponents like to cite may **not** always **work**, especially during **extreme events** such as large **earthquakes**, major **flooding**, or **wildfires** that can **degrade** the **environmental conditions** under which they are designed to operate. And in some cases, passive features can actually make accidents **worse**: for example, the **NRC's review** of the NuScale design revealed that **passive emergency systems** could **deplete cooling** water of boron, which is needed to keep the reactor **safely shut down** after an accident. In any event, **regulators** are **loosening safety** and **security requirements** for SMRs in ways which could **cancel out** any safety **benefits** from passive features. For example, the NRC has approved rules and procedures in recent years that provide regulatory pathways for **exempting** new reactors, including **SMRs**, from many of the **protective m**easures that it requires for operating plants, such as a physical **containment structure**, an offsite emergency **evacuation** plan, and an **exclusion zone** that separates the plant from densely **populated areas**. It is also considering further changes that could allow SMRs to **reduce** the numbers of armed **security personnel** to protect them from **terrorist attacks** and highly trained operators to run them. Reducing security at SMRs is particularly worrisome, because even the safest reactors could effectively become **dangerous** radiological **weapons** if they are sabotaged by skilled attackers. Even passive safety **mechanisms** could be deliberately **disabled**. Considering the cumulative impact of all these changes, SMRs could be as—or even **more**— **dangerous** than large reactors. For example, if a containment structure at a large reactor reliably prevented 90% of the radioactive material from being released from the core of the reactor during a meltdown, then a reactor 5 times **smaller** without such a containment structure could conceivably release **more radioactive material** into the environment, even though the total amount of material in the core would be smaller. And if the SMR were located **closer** to **populated** areas with **no** offsite emergency **planning**, more people could be exposed to dangerously high levels of radiation. But even if one could show that the overall safety risk of a small reactor was lower than that of a large reactor, that still wouldn't automatically imply the overall risk per unit of electricity that it generates is lower, since smaller plants generate less electricity. If an accident caused a 250-megawatt SMR to release only 25% of the radioactive material that a 1,000-megawatt plant would release, the ratio of risk to benefit would be the same. And a site with four such reactors could have four times the annual risk of a single unit, or an even greater risk if an accident at one reactor were to damage the others, as happened during the 2011 Fukushima Daiichi accident in Japan.

Trump kills regulation

Macfarlane '25 (Allison Macfarlane [Professor and director of the School of Public Policy and Global Affairs at the University of British Columbia.] "Trump just assaulted the independence of the nuclear regulator. What could go wrong?" Bulletin of the Atomic Scientists, 2-21-2025, https://thebulletin.org/2025/02/trump-just-assaulted-the-independence-of-the-nuclear-regulator-what-could-go-wrong/)//Shwillett

President **Trump**, through his recent **Executive Order**, has **attacked** independent **regulatory agencies** in the US government. This order gives the **Office of Management and Budget** power over the **regulatory process** of until-now **independent** agencies. These regulatory agencies include the Federal Elections Commission, the Federal Trade Commission, the Securities and Exchange Commission, the Federal Energy Regulatory Commission—and my former agency, the Nuclear Regulatory Commission, which I chaired between July 2012 and December 2014. An independent regulator is free from industry and political influence. Trump's executive order flies in the face of this basic principle by requiring the Office of Management and Budget to "review" these independent regulatory agencies' obligations "for consistency with the President's policies and priorities." This essentially means **subordinating regulators** to the **president**. In the past, the president and Congress, which has oversight capacity on the regulators, stayed at arm's length from the regulators' decisions. This was meant to keep them isolated, ensuring their necessary independence from any outside interference. Trump's executive order implies there are **no** longer **independent regulators** in the United States. Independent regulators should not only be free from government and industry meddling; they also **need** to be **adequately staffed** with **competent experts** and have the **budget** to operate efficiently. They also need to be able to **shut down** facilities such as **nuclear power plants** that are not operating **safely**, according to regulations. To do this, they need **government** to **support** their **independent decisions** and rulemaking. Independence matters. When I was chairman, I traveled the world talking about the importance of an independent regulator to countries where nuclear regulators exhibited a lack of independence and were subject to excessive industry and political influence. It is ironic that the US **N**uclear **R**egulatory **C**ommission—often called the "Gold Standard" in nuclear regulation—has now been **captured** by the **Trump** administration and lost its independence. So much for the Gold Standard; the Canadian, the French, or the Finnish nuclear regulator will have to take on that mantle now. To understand what is at stake, one needs to look no further than the Fukushima accident in March 2011, which showed the world how a country's **economic security** is **vulnerable** to a captured regulator. After a magnitude 9.0 earthquake followed by a massive tsunami, the Fukushima Daiichi nuclear power plant, with its six reactors on Japan's east coast, lost offsite power. The tsunami flooded their backup diesel generators, and the plant fell into the station blackout, leading to the complete loss of all power on site. With no power to operate pumps to get cooling water into the reactors' cores or into spent fuel storage pools, three reactor cores melted down—the first within hours of loss of power—with a concomitant release of large amounts of radionuclides due to containment breaches from hydrogen explosions. Firefighters desperately tried to get water into the spent fuel pool of Unit 4 to ensure that pool water did not boil off since the pumps were no longer working. Should the spent fuel rods have become uncovered and no longer cooled, the fuel's temperature would rapidly increase, and the fuel rods would melt, causing the release of even larger amounts of radiation material into the atmosphere threatening the Tokyo metropolitan area. Fortunately, the emergency workers got water to the pool within a few days of the fuel being uncovered. Nonetheless, 160,000 people evacuated from the area near the reactors and along the corridor of radiation contamination to the northwest of the Fukushima Daiichi plant. Overnight, the agricultural and fishing industries near Fukushima were devastated. Within a year after the accident, all 54 reactors in Japan were shut down—a loss of about a third of the country's electricity supply. More expensive diesel plants had to be set up to compensate for some of the missing power. The direct economic costs of the accident were estimated to be on the order of $200 billion—and even that number excluded the costs of replacing the lost power and multiple reactor shutdowns due to the reassessment of seismic hazards. Nearly 14 years later, only 13 nuclear reactors have been turned back on, and 21 have been permanently shut down. (The other 20 reactors are waiting for regulatory and prefecture approval.) An independent investigation by the Diet (Japan's house of parliament) into the cause of the Fukushima accident concluded unequivocally that: "The TEPCO Fukushima Nuclear Power Plant accident was the result of collusion between the government, the regulators and TEPCO, and the lack of governance by said parties. They effectively betrayed the nation's right to be safe from nuclear accidents." Japan's government and nuclear industry continue to struggle with the clean-up of the Fukushima site, and it purposely began in 2023 to release still-contaminated water into the Pacific Ocean. Nearby countries responded by banning fishing products from the region. As the industry often says, a nuclear accident anywhere is a nuclear accident everywhere. After the Fukushima accident, the US nuclear industry spent over $47 billion in safety upgrades to respond to lessons learned from the Fukushima accident. These included the realization that not only more than one reactor could fail at a single power plant, but also that backup generators needed to be in safe locations, not subject to flooding and other forms of failure; that generic fittings for pumps and equipment were needed so that any nearby equipment could be connected during an accident; that containments should be able to be vented remotely; that natural events such as earthquakes and flooding could be underestimated in the original reactor designs; and that spent fuel pools needed to provide real-time data in accident conditions. The upgrades that resulted from these lessons have greatly increased the safety

of reactors in the United States and elsewhere. They were required because each of these upgrades was deemed necessary to address the lessons learned by the independent regulator. On its own, the industry might not have undertaken any of these measures. What could go wrong? Several possible outcomes could occur because of Trump's new executive order assaulting the independence of the Nuclear Regulatory Commission (NRC). Proponents of **small modular reactors**, for instance, have **pressured Congress** and the **executive** branch to **reduce regulation** and **hurry** the NRC's approval of their novel—and **unproven**—reactor designs. They wish their reactors could be **exempted** from the **requirements** that all other designs before them have had to meet: detailed evidence that the reactors will operate safely under accident conditions. Instead, these proponents—some with **no experience** in operating reactors—want the NRC to **trust** their **simplistic** computer **models** of reactor performance and essentially give them a **free pass** to **deploy** their **untested** technology across the country. An accident with a new small modular reactor (SMR) would perhaps not make such a big mess: After all, the source term of radiation would be smaller than with large reactors, like those currently operating in the United States. But the accident in Japan demonstrated that countries should expect that more than one reactor at a given site can fail at the same time, and these multiple failures can create even more dire circumstances, impeding the authorities' ability to respond to such a complex radiological emergency. At Fukushima, the first explosion at Unit 1 generated radioactive debris that prevented emergency responders from getting close to other damaged reactors nearby. Since designers plan to deploy multiple SMR units to individual sites, such **an accidental scenario** appears **feasible** with SMRs. Since its creation in 1975, the Nuclear Regulatory Commission has had an excellent and essential mission: to ensure the safety and security of nuclear facilities and nuclear materials so that humans and the environment are not harmed. Trump's incursion means the agency will no longer be able to fully follow through with this mission independently—and Americans will be more at risk as a result. If any US reactor suffers a major accident, the **entire industry** will be **impacted**—and perhaps its **94** reactors in operation will even be temporarily **shut down**. Can the industry and the American people afford the cost of losing the independence of the nuclear regulator?

Warming magnifies the risk and limits efficiency

Esteban et al. '24 (Joana Portugal-Pereira [Centre for Energy and Environmental Economics (CENERGIA), Energy Planning Program (PPE), COPPE, Universidade Federal do Rio de Janeiro (UFRJ), Rio de Janeiro, Rio de Janeiro, 21941-917, Brazil.], Miguel Esteban [Department of Civil and Environmental Engineering, Waseda University, 4-1 Okubo 3, Shinjuku-ku, 169-8555, Tokyo, Japan.], Kathleen Araujo [CAES Energy Policy Institute/Boise State University, Boise, ID, USA.], "Exposure of future nuclear energy infrastructure to climate change hazards: A review assessment," Energy Strategy Reviews, 5-xx-2024, https://www.sciencedirect.com/science/article/pii/S2211467X24000725#sec1)//Shwillett

As of July 2023, nuclear energy supplied nearly 9.2% of total world power (2546 TWh), with 407 operating light water reactors (LWR) in 32 countries and a net operating capacity of 365 GW [14,15]. Currently, 58 new reactors are under construction and planned to start producing electricity in the next five years, with a total projected capacity of 60 GW [16]. Although this represents a modest growth in new and planned reactors, especially since the Fukushima Dai-ichi accident in 2011 [17], the projected capacity of nuclear energy may rise as countries develop their decarbonisation plans and energy security of supply strategies. According to IAEA estimates, the potential nuclear generating capacity throughout the world by 2050 ranges from 363 to 715 GW [16]. However, in the context of IEA scenarios to achieve net zero emission (NZE) targets by mid-century, a more aggressive expansion of nuclear power becomes necessary. Within the NZE scenarios, nuclear power generation would need to more than double by 2050, reaching 916 GW, reflecting an increase of nearly 26 GW per year over the next decades [18]. Along similar lines, three illustrative mitigation pathways (IMPs) for the Intergovernmental Panel on Climate Change Sixth Assessment Report (IPCC AR6) integrated assessment model (IAM) that are aligned with Paris Agreement temperature goals suggest a doubling in the deployment of nuclear primary energy by 2050, from 2020 levels, resulting in primary nuclear generation ranging from 18.26 to 22.24 EJ yearly [19]. Despite these forecasts in the context of NZE pledges, most **mitigation scenarios** and policies do not fully **account** for the range of **climate risks** associated with increasing global warming levels in relation to the **nuclear infrastructure** [[20], [21], [22]]. All energy supply infrastructure is **vulnerable** to climate change risks [23] and nuclear energy reactors are no exception. As thermal power plants, most nuclear reactors **depend** on **water processes** to cool down. **Climate hazards** influence **water availability** and its **temperature**, which in turn constrains a reactor's **cooling capability** and the **generation** cycle **efficiency** of turbines that may **reduce** the reactor's generating **capacity** [24]. As more than 40% of a total of 407 existing nuclear power reactors is located in coastal areas and over 100 reactors are only a few metres above the sea level [12], nuclear infrastructure is **particularly vulnerable** to SLR. Further,

considering reactors' long operating lifetimes and recent efforts to extend the lifetimes, such as those up to 80-years in the U.S.A. [25], **current** 2nd and 3rd generation reactors are expected to be affected by climate hazards and require retrofit investments to deal with climate extreme events. This means that global mitigation scenarios may be **overestimating** the potential **energy supply capacity** of nuclear reactors. .In the last decade (2010–2019), nearly **4000** weather-related outages have occurred in nuclear power plants, mainly related to warm cooling water [18,26]. This is a **threefold increase** compared to the 1990–2009 period and resulted in a **loss** of nearly **50 TWh** of potential power [12]. Recently, during the European summer heats, nuclear operators struggled to operate under extraordinary climatic and hydrologic conditions, which threatened the security of energy supply. For instance, in France and Switzerland, operators had to reduce the power outputs of reactors to avoid raising the water temperature of river flows, and were temporarily allowed to discharge cooling water in a temperature above the water quality regulation limits [27,28]. Relatedly, since 2000, the French nuclear operator EDF has lost 0.3% of its annual nuclear power production due to high river temperatures [29]. Similarly, in the USA, the Nuclear Regulatory Commission reported that **external** environment factors were the **second largest** common cause for the **failure** of nuclear reactors between 2006 and 2020 [30]. The presumption underpinning this work is that current nuclear energy infrastructure will face **increasing exposure** to climate **hazards** and that future nuclear reactors will need to be redesigned to account for future climate hazards. This is supported by observed and projected climate drivers associated with global warming scenarios. Despite nuclear power being considered one of the backbone strategies for climate change mitigation, reactors may be **highly exposed** to climate hazards, which could **hinder** their **efficient** and **secure** use in the future. Despite such risk, existing climate mitigation scenarios have **overlooked** the range of potential **effects** of climate change on energy infrastructure [31]. Previous studies have attempted to review climate change impacts on energy infrastructure [21,22,32,33]. Simoes et al. [34] applied the TimesEU IAM to investigate the effects of climate variability on the European power sector under stringent climate mitigation scenarios and based on different regional climate projections. Likewise, van Vliet et al. [35,36] used the Global Change Assessment Model (GCAM) IAM to assess the vulnerability of regional power supply sectors under different climate change-enhanced heatwave events, given the temperature increase on the cooling water and water stress. They found that power plants would likely reduce their generating capacity by 4.4%–19% between 2031 and 2060, depending on the type of cooling systems, climate scenarios, and implemented adaptative strategies. Similarly, Bartos and Chester [37] found that nearly **half** of the current thermal power plant fleet in the Western United States is **vulnerable** to **long-term** changes in **water streamflow** quantity, **air** and **water** temperature, **humidity**, and **air density**. <<<TEXT SHRUNK NONE OMITTED>>>¶ Specific to nuclear energy infrastructure, Ibrahim et al. [24], Linnerud et al. [38] and Durmayaz and Sogut [39] estimated the impacts of cooling water temperature on the thermal efficiency of nuclear water-cooled reactors based on a theoretical condenser heat balance. They found a negative linear correlation between the cooling water flow temperature, the condenser system and the turbines' thermal efficiency. The authors estimated that an increase of 1 °C in the cooling water results in a 0.12–2.0% decline in plant efficiency. Kopytko and Perkins [40] evaluated the effects of climate change on existing nuclear power plants and those under construction in the U.S.A. based on five criteria, including disruption of operations, increased financial costs, impairment of the adaptation of natural and human systems, and implications to other environmental concerns. Authors highlighted that the required adaptation measures to ensure safe nuclear reactors entail increases in construction and operation costs.¶ Overall, previous studies have generally focused on specific energy infrastructure or used thermodynamic models to estimate the implications of a temperature increase on the efficiency and generation capacity of thermal power plants. IAMs have also been used to evaluate the implications of temperature increases on power generation portfolios at regional and global scales. However, it remains unclear to what extent climate drivers beyond temperature rise, as assessed in the latest IPCC reports, will affect the projected nuclear installed capacity under stringent climate mitigation scenarios, and the potential of nuclear power to support the long-term temperature goals of the Paris Agreement.¶ This study examines how existing and planned nuclear plants will be exposed to climate change risks (e.g., average temperature rise, heat and cold waves and SLR), with an emphasis on water stress. In addition, it considers how increasing global warming levels may constrain forecasts for the expansion of nuclear installed capacity by 2050 and the end of the century. Starting with an assessment of observed and future climate impacts under different global warming scenarios (Section 2), climate exposure is evaluated of future nuclear reactors under the mitigation scenarios reviewed by the IPCC to 2050 and 2100 (Section 3). This is followed by a discussion of possible strategies to increase the resilience of the nuclear power sector (Section 4). Finally, concluding remarks and policy adaptation and mitigation recommendations for safe nuclear plant expansion are presented (Section 5).¶ 2. Dynamic interactions between observed and future climate impact drivers and nuclear energy infrastructure¶ Nuclear energy infrastructure is susceptible to surrounding environmental conditions and could be negatively influenced by future climate-related stressors. Among conditions and stressors, increases in average air surface temperatures, SLR, and extreme-weather events, such as heatwaves, tropical cyclones and winter storms, plus wind speed, humidity and air pressure constitute key physical drivers of climate change. Fig. 1 presents a conceptual diagram illustrating the cause-and-effect relationships between potential physical drivers of climate change, intermediate climate hazards, and their associated impacts on the operation of nuclear plants, which in turn pose threats to the energy security of supply.¶ <<<FIGURE OMITTED>>>¶ 2.1. Water-cooling systems and warmer ambient temperature¶ Compared to pre-industrial levels, global average surface temperature has increased by 1.15 °C [41]. Regional records indicate the existence of potential hot spots, where temperatures can be even higher than the global average. Observations suggest that high latitude regions in the northern hemisphere are warming at a faster rate compared to other regions of the planet. In Europe, average temperatures have increased by more than twice the global average, at a rate of about +0.5 °C per decade between 1991 and 2021 [42]. Furthermore, in 2023, several regions including the Middle East, Central and Southeast Asia experienced their warmest temperatures on record. Interestingly, significant investments in nuclear energy infrastructure are being made in these regions, with more than 50% of nuclear power plants under construction worldwide being located in one of these regions [15,16].¶ As air temperature rises, it is likely that the ambient temperature of the water in streams, lakes, and oceans will also increase. While water temperature variability is not as pronounced as air temperature anomalies, due to factors such as thermal inertia and ecosystem dynamics (e.g., glacier melting and ocean circulation changes), it is expected nonetheless to affect nuclear power plants. Studies have shown that there is an increase of 0.6–0.8 °C in open freshwater temperature for every 1 °C increase in air temperature [43]. According to the latest NOAA climate report, sea surface temperature (SST) has increased by approximately 0.13 °C per decade over the past 100 years, which is the highest rate since modern recorded data exists [44]. Anomalies in open water temperature are expected to impact the cooling systems of nuclear power plants in terms of: (i) Carnot efficiency, (ii) generating capacity and (iii) operating capacity factor.¶ An increase in the open water temperature reduces the Carnot efficiency of thermal power plants, thereby limiting their generating capacity and load. Higher temperatures result in reduced maximum condenser pressure, leading to a decreased efficiency in turbines. A 1 °C warmer ambient water in the condenser cooling water may reduce the thermal efficiency of a pressurized-water reactor nuclear power plant by 0.12–0.16%. Thus, a higher temperature in the open water used in condensers may lead to reduced power generation or require redesigns to compensate for the reduction in Carnot efficiency and power outputs.¶ Additionally, under higher ambient water temperatures the thermal dilution of heat released from nuclear power plants is reduced, as warmer ambient water diminishes the maximum amount of cooling water that can be returned back to the environment. Higher temperatures in water bodies due to discharges of coolant decrease oxygen levels, which can impact the biodiversity and trophic web of ecosystems [45]. Currently, the US Environmental Protection Agency (EPA) is revising its regulatory framework to strengthen the discharge threshold of the steam electric wastewater flow in order to reduce impacts associated with thermal pollution [46]. Likewise, the European Commission has recently revised its Urban Wastewater Treatment Directive, originally adopted in 1991. The revised directive was adopted in 2023 and includes updated standards to minimise the thermal impacts of industrial discharges [47].¶ 2.2. Clogging due to biological contamination of cooling water under warmer ambient temperature¶ The eutrophication of coastal waters has become more frequent due to global warming and the increase in ambient water temperature. Eutrophication typically occurs during summer periods due to limited water flows and reduced oxygen content in ecosystems, which fosters the development of a variety of microorganisms, namely alga blooms, red, green and brown tides. Blooms of jellyfish, mussels, clams, and other organisms are also more frequent in warmer environments. When accumulated near nuclear power plants, these outbreaks of organisms can create biofoulers which may block cooling water pipe intakes and impact on the plant structures [48]. Further biological growth in water circuits can result in impacts related to corrosion and other safety issues [49]. Rajagopal et al. [50] conducted a comprehensive survey of power plant operators in Europe, highlighting issues related to biological clogging in nuclear power plant operations, mainly blockages in cooling towers by cyanobacteria and the clogging of water intake due to seaweeds, gelatinous organisms, and shoals of fish. <<<SHRINKING ENDS>>>¶ 2.3. Reduced water access in LWR during droughts and heatwaves Since pre-industrial times, global warming has increased the **frequency** and **intensity** of extreme **weather** and **climate** events [51], including **droughts** and **heatwaves**. As a consequence of changes in **atmospheric circulation** patterns, in some regions there has been a reduction in continental **surface humidity**, which contributes to **regional drying** [52]. Further, hotter temperatures have increased the number of heatwave days, and created precipitation deficits and changes in runoff and surface water that cause hydrological droughts. Overall, there is evidence that, in some regions, warmer days increase the intensity and duration of heatwaves, which directly and indirectly may trigger hydrological droughts. Since 1950, observed trends suggest that hydrological drought events are more frequent than before [53,54]. More frequent and severe hydrological droughts have **direct implications** on thermal power plants, given that they must release waste energy in the form of heat and are dependent on cooling water systems (see Section 2.1). Unlike other thermal power plants, nuclear fuel-driven1 reactions have a high thermal inertia and cannot be immediately interrupted. For this reason, nuclear thermal power plants require significantly higher amounts of water than other

power plants (see Table 1). The **removal of heat** from reactors via **coolant agents** is thus constantly needed to ensure reactors do not shift into a **meltdown**. .<<<FIGURE OMITTED>>> Most existing nuclear reactors utilise water-cooling systems, as is evident with the aptly-named LWR. A typical 1 GW nominal capacity reactor produces around 3000 MW of heat, and just one third of it is used in thermal turbines to generate power. Thus, to remove the wasted heat, nuclear reactors require large amounts of water. For this reason, they are located on a coastline or close to river flows or lakes. A typical nuclear LWR power plant consumes between 1500 and 3000 L of water per MWh generated [57].

Meltdowns cause extinction

Slocum '15 [Christopher Allen; June 21; VP @ AO&G; The Hidden Costs of Alternative Energy Series, "A Theory for Human Extinction: Mass Coronal Ejection and Hemispherical Nuclear Meltdown"; http://azoilgas.com/wp-content/uploads/2018/03/Theory-for-Human-Extinction-Slocum-20151003.pdf] With our intelligence we have littered the planet with massive spent nuclear fuel pools, emitting **lethal radiation** in over-crowded conditions, with circulation requirements of **electricity**, **water**-supply, and neutron **absorbent chemicals**. The failure of **any** of these conditions for any calculable or incalculable reason, will release all of a pool's **cesium** into the **atmosphere**, causing 188 square miles to be contaminated, 28,000 cancer deaths and $59 billion in damage. As of 2003, 49,000 tons of SNF was stored at 131 sites with an additional 2,000-2,400 metric tons produced annually. The NRC has issued permits, and the nuclear industry has amassed unfathomable waste on the premise that a deep geological storage facility would be available to remediate the waste. The current chances for a deep geological storage facility look grim. The NAS has required geologic stability for 1,000,000 years. It is impossible to calculate any certainty 1,000,000 years into the future. Humanity could not even predict the mechanical failures at Three Mile Island or Chernobyl, nor could it predict the size of the tsunami that triggered three **criticality** events at Fukushima Daiichi. These irremediable crises span just over 70 years of human history.

How can the continued production and maintenance of SNF in pools be anything but a **precedent** to an **unprecedented human cataclysm**? The Department of Energy's outreach website explains nuclear fission for power production, providing a timeline of the industry. The timeline ends, as does most of the world's reactor construction projects in the 1990s, with the removal of the FCMs from Three Mile Island. One would think the timeline would press into the current decade, however the timeline terminates with the question, "How can we minimize the risk? What do we do with the waste?" (The History of Nuclear Energy 12). Nearly fifteen years into the future, these questions are no closer to an answer. The reactors at Fukushima Daiichi are still emitting radioisotopes into the atmosphere, and their condition is unstable. TEPCO has estimated it could take forty years to recover all of the fuel material, and there are doubts as to whether the decontamination effort can withstand that much time (Schneider 72). A detailed analysis of Chernobyl has demonstrated that nuclear fall-out, whether from thermonuclear explosions, spent fuel pool fires, or reactor core criticality events are deleterious to the **food-chain**. **Cesium** and strontium are taken into the **roots** of **plants** and **food** crops, causing direct **human** and **animal** contamination from ingestion, causing cancer, teratogenicity, mutagenesis and death. Vegetation suffers mutagenesis, reproductive loss, and death. Radioactive fields and **forest** floor**s decimate invertebrate** and **rodent variability** and number necessary to supply nature's **food-chain** and **life cycles**. The **flesh and bones** of freshwater and oceanic biota contribute significantly to the total radiation dose in the food-chain. Fresh **water lakes**, **rivers** and **streams** become radioactive. Potable **aquafers** directly underlying SNFs and FCMs are penetrated by downward migration of radioisotopes. **Humans must eat to live. Humans must have water. No human can survive 5 Sv of exposure** to ionizing radiation, many cannot survive exposure to 1 Sv.

Realizing the irremediable devastation caused by one thermonuclear warhead, by one Chernobyl, by one Fukushima Daiichi, it remains to be said that the **earth** can handle as many simultaneous loss of coolant failures as nature can create. **Humanity cannot**. It is not good enough to lead by relegating probable human wide extinction phenomena to an appeal to lack of evidence. Policy **cannot** indefinitely **ignore** responsibility by requiring further study. Nor can leadership idle into **cataclysm** by relying on the largest known natural phenomena of the last 200 years. Permitting construction and continued operation of malefic machinery, based on 200 years of cataclysmic experience is a protocol for calamity. Of coronal mass ejections, Hapgood warns, that we need to prepare for a once-in-1000-year event, not just simulate infrastructure safeties by the measure of what we have seen in the past. The same is true for all natural phenomena. The future of humanity is too precious to operate with such insouciance. The engineering is not good enough. It never will be. Nature is too unpredictable, and nuclear power is too dangerous.

Nuclear terror causes extinction.

Poneman 19 [Daniel B. Poneman, President and Chief Executive Officer of Centrus Energy, Member of the Board of Directors at the Atlantic Council, former United States Deputy Secretary of Energy, J.D. from Harvard Law School, M.Litt. in Politics from Oxford University, "The Nuclear Threat," in Double Jeopardy: Combating Nuclear Terror and Climate Change, MIT Press, 2019, https://www.jstor.org/stable/pdf/26937417.pdf?casa_token=JmwLlI4MtusAAAAA:TUbNOdrZqlgTtNkF5bNQWMsk8AHK3i1hKAYaY-AR9CRfd4wQpXCD4eNfjZ-oM5v5yU1ZZV0SaYixpv6ri-8G6YiOVIgJHo1xJt8iAa8KEsq4lezbJjM9]

Disturbingly, while conventional state-based nuclear proliferation continues to present clear and present dangers, the **proliferation threat** from violent **non-state actors** has become still **more frightening**. Classical strategic theory relies on a party to be deterred from using nuclear weapons by the fear that its adversary will respond with devastating force, killing the attacker and destroying its assets. For a terrorist with no fixed address, no territory or property to defend, and no reluctance to die in a suicide bombing, the typical preconditions to **classical deterrence** do not obtain.

That is why the scourge of terrorism is in many ways more dangerous than state-based proliferation and adds immeasurably to our collective vulnerability. **Terrorists** from points **around the globe** have shown a depravity and propensity for **ruthless violence** and other actions that flout all norms of civilization and human decency. And they have already employed **w**eapons of **m**ass **d**estruction, as in the 1995 sarin nerve gas attack launched by **Aum Shinrikyo** in the Tokyo subway, which killed thirteen and injured or affected thousands more.

The rise of Al Qaeda and the September 11, 2001, attack upon the American homeland added a horrifying new dimension to the specter of nuclear destruction. As early as 1998, Al Qaeda leader **Osama bin Laden** called possession of nuclear weapons a **"religious duty."**95 After the United States launched Operation Enduring Freedom against the Taliban following the September 11 attacks, U.S. troops discovered rudimentary nuclear weapon designs in a safe house in Kabul.96 Every U.S. president since that time has viewed the threat of terrorist use of nuclear weapons as a grave national security threat. In 2010, when Secretary of Defense Robert M. Gates was asked what kept him up at night, he replied, "It's the thought of a terrorist ending up with a weapon of mass destruction, especially nuclear."97 And in December 2017, Secretary of Homeland Security Kirstjen Nielsen ramped up efforts to combat this threat by establishing the Countering Weapons of Mass Destruction (CWMD) Office, in order to "elevate and streamline [Department of Homeland Security] efforts to prevent terrorists and other national security threat actors from using harmful agents, such as chemical, biological, radiological, and nuclear material and devices to harm Americans and U.S. interests."98

While the **passage of time** and the **dissemination of tech**nology inexorably bring the prospect of the spread of nuclear weapons ever nearer, an even closer danger now demands attention: **radiological terrorism**. To succeed in this, terrorists do not need technological sophistication, industrial capabilities, or access to fissile materials. They just need to get their hands on **radioactive sources** such as cesium-137, cobalt-60, or other isotopes—used at thousands of medical, industrial, and research facilities around the world— and then combine them with **conventional explosives** and detonate them. No mushroom cloud or flattened buildings would result, but a radioactive contamination event could paralyze the communities under attack while sowing mass panic and terror.

Former U.S. Senator Sam Nunn, cosponsor with Senator Richard Lugar of the landmark Cooperative Threat Reduction (CTR) legislation that reduced nuclear threats after the break-up of the Soviet Union, distinguished "dirty bombs" from nuclear weapons, the archetypical weapon of mass destruction, in this way:

We call radiological a "weapon of mass disruption." It is, of course, less catastrophic than a terrorist with a nuclear weapon—but it is a higher probability threat and the word "disruption" understates the devastating **economic consequences** if certain types of radiation [are] released. Imagine what it would mean to see Wall Street, the Port of Rotterdam or the Singapore airport become a "no-go zone" overnight and for years to come.99

Even if a terrorist lacks the wherewithal to build a nuclear weapon, it takes no great skill to appropriate radioactive sources widely available in community hospitals and clinics, attach a conventional explosive, and detonate a "dirty bomb." This is why fifty-three world leaders and four international organizations at the 2014 Hague Nuclear Security Summit committed to "preventing terrorists, criminals and all other unauthorised actors from acquiring nuclear materials that could be used in nuclear weapons, and other radioactive materials that could be used

in radiological dispersal devices."100 Many intelligence failures have resulted more from a lack of imagination than a lack of data; let us not repeat that error.

How do today's dangers stack up historically? One barometer to consider is the Bulletin of the Atomic Scientists, the magazine launched in 1945 by Manhattan Project scientists "who could not remain aloof to the consequences of heir work."101 The Bulletin is perhaps best known for its Doomsday Clock, a metaphor that aims to warn the public about "how close we are to destroying our world with dangerous technologies of our own making." The clock was set to seventeen minutes to midnight after the Cold War ended but—after the September 11, 2001, attacks—the organization moved it to seven minutes to midnight. That was the same as its original setting when the clock was created in 1947.

The bottom line is that after seventy years of deterrence, arms control, and nonproliferation efforts, nuclear weapons still pose an **existential threat** to humanity. Thousands of nuclear weapons remain in the world; the technology to build the weapons has become widely dispersed; and the materials are challenging but not impossible to obtain. In January 2018, the Bulletin advanced the time from two-and-a-half to two minutes before midnight—the closest to midnight since the Doomsday Clock was launched. (The only other time it reached two minutes was in 1953, at the height of the Cold War.) In explaining its decision, the Bulletin cited not only the threat of nuclear annihilation posed by North Korea and other actors, but also the failure to act effectively to prevent potentially catastrophic climate change.102

Prolif goes nuclear---first-strike vulnerabilities cause miscalc and accidents.

Stephen J. **Cimbala 22**—Distinguished Professor of Political Science at Penn State University, Brandywine, and Lawrence J. Korb is a senior fellow at the Center for American Progress and a former Assistant Secretary of Defense, 4/17/2022, "Nuclear Proliferation Is Not the Answer to the War in Ukraine", The National Interest, https://nationalinterest.org/feature/nuclear-proliferation-not-answer-war-ukraine-201862

Considering the **downside costs** of **regional nuclear arms races**—including massive financial costs, **increased risks of proliferation** or **accidents**, and potential sanctions—it is **doubtful** that **any state** in the **Middle East** or the **Indo-Pacific will improve their security** by **developing nuclear weapons**. Instead, a growing number of states with small- or medium-sized nuclear arsenals will **create more anxieties** about the **first-strike vulnerability** of those forces. Few of these prospective nuclear weapons states can afford a fleet of ballistic missile submarines, currently the most survivable platforms among operationally deployed launch systems. These countries will therefore depend almost exclusively on aircraft or missiles that are **less survivable** and **require their commanders to preempt their opponents**. More states will deploy more forces, **fears of a surprise attack will multiply**, and the **need for survivable counter-strike capabilities** will lead to more nuclear weapons deployed on a **"hair trigger."**

Although Russia's war against Ukraine might lead some to conclude that nukes are a prescription for safety, the opposite is more likely to be true. **Nuclear deterrence** in a post-post-Cold War world **is less dependable** than it was during the Cold War because: first, the stability provided by U.S.-Soviet strategic **nuclear bipolarity is gone**; second, some **hot zones** such as **Asia** are already **overcrowded** with **nuclear state actors** whose leaders have **no democratic accountability**; and, third, leaders with or without nuclear weapons are perfectly willing to act in ways that some might judge as **"irrational"** according to their own definitions of victory. In this environment, nuclear guarantees might turn from **deterrents** into **black holes**.

1NC

Rate hikes cause capital flight, debt crisis, and popping asset bubbles in emerging economies.

Xinru **Li 24** - Jiangsu Ocean University, China. “The Effect of the Fed Interest Rate Hikes on the Financial Crisis Evidence from Emerging Market Economices,” 05/13/24, Asian Journal of Economics, Business and Accounting 24(6), pg215-25, https://doi.org/10.9734/ajeba/2024/v24i61355.

3. **FED RATE HIKES** AND THE **CAUSE**S 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 transmission effect 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 debtservicing 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 **Asia**n economic crisis of 1997[9] and the **Russia**n 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. [FIGURE 1 OMITTED] 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]. [FIGURE 2 OMITTED] [FIGURE 3 OMITTED] [FIGURE 4 OMITTED] 4. ANALYSIS OF THE RELATIONSHIP 4.1 Influence of the Dollar on the Economy With five interest **rate hikes** by the **Fed**eral Reserve, five **financial crises** have **erupt**ed **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 changes in **global capital flows**. As United States Treasury yields rise, capital may be more inclined to flow to the United States, **lead**ing to **capital outflows** from **e**merging **m**arkets. 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.

Deficit spending spikes interest rates

Professor Young finds that when the government spends in excess of its revenues it has to compete with private borrowers, leading to increased demand that puts upward pressure on interest rates and crowds out private investment.

Young ’13 (Andrew Young [Andrew T. Young is an associate professor of economics at West Virginia University and the College’s BB&T Scholar. His papers have been published in Public Choice; Journal of Money, Credit and Banking; Review of Economics and Statistics; Managerial and Decision Economics; Review of Economic Dynamics; and Review of Austrian Economics.] “Why in the World Are We All Keynesians Again? The Flimsy Case for Stimulus Spending,” Cato Institute, 2-14-2013, https://www.cato.org/sites/cato.org/files/pubs/pdf/pa721_web.pdf)//Shwillett

Crowding Out To believe that there may be spending **deflators**, rather than multipliers, associated with **stimulus** spending, one does not have to believe that U.S. citizens are experts on public finance, poring over Congressional Budget Office projections and forming rational expectations of their future tax liabilities. Largely one just has to believe that they respond to **market prices** and, in particular, market interest **rates**. When the federal government pursues **spending** in **excess** of its current tax **revenues**, it has to turn to financial markets and **compete** with **private borrowers** for funds. The increased **demand** for funds will, all else equal, put **upward pressure** on **interest rates**, making borrowing more costly. By

raising the cost to private borrowers—both individuals and businesses—government deficit spending tends to **crowd out** private **investment** expenditures and **consumption** expenditures that are **sensitive** to interest rates (e.g., car purchases). Furthermore, higher costs of borrowing also mean higher returns to saving. As the government increases its demand for funds, this must be satisfied by increases in **private savings**. This also discourages **private consumption** expenditures.

Indeed, a recession is devastating.

Bradford '13 furthers [Harry Bradford, Prize-winning conductor and choral director; 4-5-2013, "Three Times The Population Of The U.S. Is At Risk Of Falling Into Poverty," HuffPost, https://www.huffpost.com/entry/global-poverty-900-million-economic-shock_n_3022420, accessed on 10-16-2023] tristan + leon

Hundreds of millions of people worldwide are on the brink of poverty. A recent study by the International Monetary Fund warns that as many as **900 million people could fall back into poverty in the event of an economic shock like the Great Recession**. **That figure is three times the size of the U.S. population**. According to the World Bank, 1.2 billion people are currently living on less than $1.25 a day.

Soft landing is coming now but it's fragile

Brusuelas and Nyugen '25 (Joseph Brusuelas [Chief economist to the middle market is the preeminent voice championing issues and policies facing midsize companies in the United States and around the world. An award-winning economist, Brusuelas has more than 20 years' experience analyzing U.S. monetary policy, labor markets, fiscal policy, international finance, economic indicators and the condition of the U.S. cons], Tuan Nyugen [Tuan Nguyen is an economist at RSM US LLP who analyzes high-frequency economic data within the United States and global economies to better understand the American middle market. Tuan's data-driven economic analysis and insights enhance the ability of middle market companies to thrive in an increasingly competitive global economy. In December 2023, Nguyen and the economics team were recognized on Bloomberg's list of Best Bond Forecasters after correctly predicting where the benchmark Treasury would end the year.], "Market minute: Soft economic landing at risk," The Real Economy Blog, 2-20-2025, https://realeconomy.rsmus.com/market-minute-how-tariffs-put-the-soft-landing-at-risk/)//Shwillett

The **Federal Reserve** is on the **verge** of achieving that rarest of economic feats: A **soft landing**. The **rapid disinflation** that the Fed has engineered over the past two years mirrors that of the **1990s**—the last time the central bank achieved such a difficult feat. That disinflation set the stage for a long **period** of **productivity** gains and **low inflation**, driven by **technological advancement** and **open trade** policies. During that time, productivity increased by well above 2% a year, while disinflation, and in some cases outright deflation, kept import prices in check. Now, improving **labor productivity**, advances in **artificial intelligence** and the Federal Reserve's progress toward its **2% inflation** target have all given rise to the prospect that a **similar** kind of **sustained expansion** can be replicated. .The potential gains are significant. The U.S., with services accounting for about two-thirds of total spending, could **reap tremendous** benefits from the widespread **implementation** of **AI** within the service sector. That adoption would

almost certainly spill over into the tradables sector, setting the stage for an AI-driven boom. <<<FIGURE OMITTED>>> But businesses, and the economy overall, face **considerable uncertainty** over the prospect of sharply higher tariffs. Today's tariffs are the opposite of the globalization trend in the 1990s, and they are threatening to **undo** the Fed's efforts to curb inflation. An increase in tariffs along the levels being discussed in Washington only raises the **probability** of rising **goods** inflation, which has been climbing in recent months. The Fed would then face a difficult decision. Instead of returning to its neutral rate target by the end of 2027, the central bank would almost certainly have to hike its policy rate keep inflation at tolerable levels.

1. DEBT. Best data proves nuclear is expensive and risky

GE '24 (Greenpeace European, "Nuclear power's financial problems exposed in new report, Greenpeace European Unit," 6-19-2024, https://www.greenpeace.org/eu-unit/issues/climate-energy/47124/nuclear-powers-financial-problems-exposed-in-new-report/)//Shwillett

Nuclear power is a **risky gamble** with **taxpayers'** cash, according to a **comprehensive** review of **financing models** published as the European Investment Bank prepares to discuss new support for nuclear energy at a meeting on 21 June. The report, Fission for Funds: The Financing of Nuclear Power Plants, gives an **overview** of financing **models** and reveals how the **profitability** of nuclear power plants **heavily relies** on government involvement in **de-risking** investments. The report was commissioned by Greenpeace Germany and carried out by Jens Weibezahn from the Copenhagen School of Energy Infrastructure, and Björn Steigerwald from the Technische Universität Berlin. Greenpeace EU political campaigner Lorelei Limousin said: "Nuclear power is a **black hole** for taxpayers and consumers. **High** upfront **costs**, **long construction** times, and **government bailouts** make nuclear projects a burden on **public coffers** and a threat to credible climate action. **Wind** and **solar** energy are already much **cheaper**, and their **cost** is **declining**. Not a single euro of EU public money should go to nuclear power – it's time to put people's needs ahead of nuclear greed, and invest in a safer, cheaper future." The report shows that nuclear power plant projects are **unreliable** due to **budget overruns**, construction **delays**, and **reliability** problems in the **operational** phase, and therefore often **lose investor interest**. **Hidden costs** are also often not included in **initial calculations**, such as **liability insurance**, **decommissioning** and **waste management**. These become a burden for taxpayers in the future. The report highlights that the cost of solar and wind energy are already much lower than new nuclear projects. Jens Weibezahn, Assistant professor **Ph.D.**, Copenhagen Business School, co-author of the report, said: "In our review of current nuclear power plant projects, we found that almost all financing models rely – either directly or indirectly – on government support to make them viable. This places an unreasonable burden on either taxpayers or electricity ratepayers, as they, ultimately, bear a **large** part of the associated **financial risks**." Although most global economies are focusing on renewables to reach net-zero targets, some EU countries, such as France, the Netherlands, Poland, Sweden, Slovakia, Slovenia and the Czech Republic, are betting on nuclear power, despite major issues in securing funding for new projects and maintaining their existing ageing fleets. This report highlights that government support for these costly, long-term, and high-risk nuclear projects is becoming harder to justify, particularly at a time of high inflation and rising cost of living. In the past two decades, the European Investment Bank (EIB) has invested €845 million in nuclear power activities. For the first time, the EIB intends to support research and development in so-called small modular reactors (SMRs), according to a draft strategic roadmap, which will be adopted on 21 June. Many **uncertainties persist** regarding the overall economic viability of **SMRs**, not to mention safety risks and the radioactive waste problem. Greenpeace calls on EU finance ministers, who govern the EIB, to oppose **any** funding for nuclear energy, **including small modular reactors.**

Near-term factors put the US on the brink

Dr. Keohane finds that the US is on the brink of an economic collapse as law makers have to deal with budget caps and the expiration of the TCJA. Both Dems and republicans want to extend those provisions, growing the national debt to unprecedented levels. With the fastest growing interest payments creating a clear danger.

Dr. Nat **Keohane et. al 24**. President, Center for Climate and Energy Solutions; former Senior Vice President for Climate, Environmental Defense Fund; former Special Assistant to the President for Energy and Environment, Obama White House; PhD, Political Economy and Government, Harvard University. Justin Worland: Senior Correspondent and Outrider Foundation fellow, TIME. Alex Flint: Executive Director, Alliance for Market Solutions; former staff director, Senate Committee on Energy and Natural Resources. Maya MacGuineas: President, Committee for a Responsible Federal Budget; MPP, JFK School of Government, Harvard. "Opportunity and Costs: A potential bipartisan pathway for pricing carbon in 2025." Center for Climate and Energy Solutions Webinar, YouTube. Jun. 5, 2024. https://www.youtube.com/watch?v=ggyyCC5ItYI. [Transcript from YouTube, corrected by hand.]

[KEOHANE] Good morning, and thank you for joining us today. I'm Nat Keohane, and I'm the president of the Center for Climate and Energy Solutions, or C2ES. For those of you new to C2ES, we are a nonpartisan, nonprofit organization working to secure a safe and stable climate by accelerating the transition to a thriving, just and resilient net zero economy. It's a pleasure to welcome you today to the Pricing Carbon Initiative's public forum on Opportunity and Costs: A potential bipartisan pathway for pricing carbon in 2025. I'm particularly pleased to be hosting this public forum because C2ES has long supported market-based approaches to address climate change. Since our founding over 25 years ago, we've worked with policymakers, businesses and other stakeholders to build support and advance market-based solutions at the state and national levels. C2ES has also been an active participant and a steering committee member of the Pricing Carbon Initiative. PCI provides a forum to foster dialogue across the political spectrum on viable solutions that price carbon pollution. Today's public forum features a discussion with two leading thought leaders who have come to support carbon pricing, primarily for **fiscal reasons**. All of us on this public forum know that carbon pricing is a **critical component** of **any** comprehensive approach to reducing climate pollution and getting the world on a pathway to **net zero** emission. Of relevance for today's forum is another clear benefit from pricing carbon: that doing so can raise **significant** government revenues. New revenues are especially important if we're looking to address **fiscal concerns**. Now, 2025 is shaping up to be a historic year for fiscal policy. **Next year**, lawmakers will have to deal with another **debt ceiling** fight, the end of **budget caps** on defense and non-defense spending, and the **expiration** of many tax provisions in the 2017 Tax Cuts and Jobs Act. On this last point, the expiration of the **TCJA** provisions will **lead to tax increases if nothing is done**, and such, there's strong interest among both Democrats and provisions- and Republicans to **extend** some of those provisions, which are estimated to cost more than **$4 trillion** through 2034 and would **grow our national debt to unprecedented levels** if not paid for. And rising federal debt would have social, economic, and national security impact. More debt means it'll cost more to borrow and more federal money will be spent servicing debt than on providing government services. One potential solution to help address this **looming fiscal cliff** is a **carbon tax**, which could raise **trillions** of dollars to help **pay down** the deficit and reduce- and pay for tax increases- sorry- and pay for **tax reductions**. A carbon tax would simultaneously raise our climate ambition to **ensure** that we achieve our **near-term climate goals** and get on a firmer trajectory to achieving net zero CO2. C2ES and others see a window of opportunity next year, albeit a narrow one, where fiscal necessity **demands** new revenues, and a price on carbon could **provide those revenues**. So that's what we'll be talking about today. Before we begin, I want to cover a couple of housekeeping items. First, we are recording this webinar, and a recording of the webinar will be made available on the C2ES YouTube page within 24 hours. Second, the format of today's webinar will be a moderated chat and panel discussion. Justin Moreland, Senior correspondent for TIME, will moderate a conversation with Maya MacGuineas, the president of the Committee for a Responsible Federal Budget, and Alex Flint, executive director of the Alliance for Market Solution. Maya and Alex will reflect on how fiscal budgetary concerns may open up new doors for carbon pricing in 2025. Following their conversation, Alden Meyer, senior associate at E3G, will moderate a panel with Rob Shapiro, the founder and chairman of Sonecon, Christina DeConcini, who is the director of government affairs at the World Resources Institute and also the chair of the board of the Pricing Carbon Initiative, and George Behrakis, president of Young Conservatives for Carbon Dividends. We'll try to leave some time at the end for audience Q&A and the discussion. Please submit your questions into the Q&A portion of Zoom and we'll try to answer them. And with that, let me turn it over to Justin. Hi, Justin, and thanks for joining us to moderate. [WORLAND] Hi, Nat. Thanks, thanks for the introduction, uh, laid the ground pretty well. Just to reiterate, my name is Justin Worland. I write about climate at TIME based out of DC, and I've been writing about climate for about the last decade, and a lot has changed. One thing that hasn't changed is speculation about a carbon price, as a potential solution on the Hill. And so, it's exciting that that's continuing to happen now, but perhaps, with dynamics that might actually make this more real than it has been in the past, as, as Nat laid out, many of the sort of fiscal drivers that are coming to a head in 2025 and so, excited to dig into that over the next half hour with Alex and Maya. You know, Alex, you've been making this case for years that fiscal concerns might be the catalyst that would would finally bring, make a carbon tax a possibility in the US. And as, as Nat laid out in 2025, we have a number of things coming to a head, from the expiration of the tax, tax cuts to, you know, sustained higher interest rates, etc., etc. Maybe you can just start by making the case why this is, this is the moment.

[FLINT] Well, it's- [WORLAND] Or, it might be the moment, let me, let me say that. [FLINT] Yep. I think we will eventually reach the moment. It's a question of when. And, something about your comments made me think back to my evolution and why I came to believe that a carbon tax is going to eventually be enacted. I was staff director of the Senate Energy Committee through 2005. And when Waxman-Markey was being considered in 2009, I was very involved in the negotiations on that cap-and-trade approach. And what I found in those negotiations was that in order to garner additional votes - and recognize the bill was never successful, the proponents never got enough votes for that to pass the Senate - but in making the trade-offs to gain votes, they undermined the integrity of the potential, the cap-and-trade system. And I learned from that experience that building the necessary consensus around a climate policy specifically to address climate was very, very difficult, and I think may have, may be impossible. And so what I began to do was thinking about what are the policy options that address climate, but have the potential to build enough support to really enact sustainable, durable climate policy. And so, for me, it was this opportunity for climate policy and fiscal policy to converge on something where there really can be two pillars to support the policy and two sets of justifications that come together to build enough support for something to pass the House, pass the Senate and be enacted into law by the President. And so, for me, it was this the potential of a political deal. Now, the question today is: what's the opportunity for the deal? And it's not an opportunity that we all embrace and celebrate. It's really, are we pressed to where a deal becomes necessary? And I think that's what we're looking at. Are, are the forces continuing to build both from a climate perspective and a fiscal perspective that we eventually are forced to this moment where politics have to change and we have to do something new. And I do believe that

eventually that's going to happen, right? I mean, the climate, you know, I was looking at the MIT En-ROADS model that they've just done a big update of, shows average global temperature increasing six degrees Fahrenheit by 2100, seas rising 2.5ft by 2100. That's going to necessitate bigger climate policies than we've done. And Maya is, is very familiar with the fiscal drivers. This is a case where the sooner we do this, the better. It would be nice to do this through some sort of enlightened perspective realization or the potential of a deal. We may be, we may delay and the crises – both of them – may be larger, but eventually they will converge. And in the near term, I think it's the fiscal drivers that Maya specializes in that are going to get us there first. [WORLAND] Well, so let's, let's turn to Maya then. And I mean, it'd be great to get your journey, you know, coming, to support, a carbon price, but also, you know, maybe lay out the fiscal policy drivers and why, why this is something for, the Committee for Responsible Federal Government- Federal, excuse me, Federal Budget to engage on. [MACGUINEAS] Good. Thank you. And good job on the name, because getting it almost right is like, a huge success. Most complicated name of an organization. [WORLAND] I do have it written down in front of me, but, so it's a little bit of a cop-out. [MACGUINEAS] I often have to do the same thing. It's, it's a lot of words. So, let me, let me lay out the fiscal picture a little bit, just for a moment to frame the discussion and then talk about these issues and why they converge so elegantly, I think. So the fiscal situation is by any account, it's **really bad**. It's really bad. I know that that is what I focus on, but there is **nobody** who can pick up a Congressional Budget Office report and read where we are and where we're headed and not become concerned. So we now have a debt as a **share of GDP** that is about to be at the **highest level historically** we've **ever** had in the country. The only other time it was higher than this was right after **World War II**, when we had obviously fought a World War. This time we've gotten there from some emergencies where we **should have borrowed** – the Great Recession, COVID, those are the times you **do want to borrow** – but also from a whole lot of borrowing we do for no good reason other than that the political environment is unwilling to pay for things, and that has become the norm, and that's problematic. As a result, single fastest growing part of the federal budget is **interest payments**. This year, for the first time, interest payments are the second highest thing, line item in the budget. They are higher than **Medicare**. They are higher than **national defense**. Like, these are **big red warning signs**. We have two major trust funds in Social Security and Medicare that are **both** headed towards **insolvency within a decade**. These are not the kinds of things that you should wait until the **last minute** to address, because these are programs people depend on, and you have to make these changes as gradually as possible, phase them in, give people time to understand what's happening, whether you're raising taxes, slowing the growth of benefits, both, and we're waiting till the last minute. So, there's just warning signs everywhere. We are on track, if we do nothing new – we will put in place more borrowing, I can **promise** you that – but if we do nothing new, we will borrow another **$20 trillion** over the next decade. So, the first point is the fiscal situation is genuinely really dangerous. And I can go more into why that matters. But it has profound **economic** effects, your ability to respond to **future crises**, **national security** effects, it stops us from redoing our **social contract** so it can address the problems of the **current economy** rather than **last century's**, there are a lot of issues that it stands in the way of. The second point I would make is fiscal and climate are very similar, and this is one of the parts of my journey. As I started to spend more time trying to think, how do you get people to focus on this issue of fiscal policy? And I happen to care about environmental issues, but you can't avoid seeing the similarities, which is, when you have an issue that is a **clear danger**, but it is not a specific **turning point** – people say, "at what level will the debt become a problem?" Like, **nobody knows**. It's when the **markets** become concerned. It's when other places around the country – uh, around the world create rivals to our safe haven, reserve currency options. Nobody can **time it.** Nobody can time when climate becomes like, oh, there's no **return**. This is the frog in the **boiling water**, right? It's slowly, slowly, slowly getting worse. **And then you're dead.** Hopefully we're not dead. But there is no action forcing moment on these two issues, and given that we have a governance structure that only responds to crises, it's really hard to get people to act. Then just quickly, why I am optimistic about this? I'm not sure, I'm not sure it's still deserved. But, I continue to have this belief that there'll be a lot of political posturing, posturing, and the polarization makes this all much harder than it used to be, but in the end, good policies will be the first ones that we reach to do. And when we acknowledge that there was a fiscal structural problem, it would take $7 trillion in savings just to keep our debt basically, where it is. We're not going to balance our budget, that would take $15 trillion in savings over ten years, that's not going to happen, but 7 trillion is a number to keep in mind of a reasonable target. There is **nothing** that can really be as helpful as putting a **price on carbon**. But the real benefit is you actually have a two-fer or potentially a **three-fer**, which is you help **climate**, you help the **fiscal** situation, and it can raise enough **revenues** that you could actually meet **additional needs** if you want to do **other things** in addition to reducing the debt. So I think it's the single most promising policy out there, literally the single most promising. and so that's why I'm hopeful that when we go through all the bad policies which we seem to be focusing on, this is the one that will start to make sense and we'll have a bipartisan coalition as needed to make progress. [WORLAND] Well, there's a great there's a lot of threads from both of you there to pull on, but I want to maybe just turn to this sort of political question. I mean, okay, so from a policy perspective, it makes sense, there's this alignment. Do you see folks who might consider themselves deficit or budget hawks interested in, in, you know, a carbon tax. Is that, is that something where you see momentum, even, even awareness, perhaps as a, as a potential policy solution? And, Maya, you can start on that and, or Alex if you prefer.

1. DISPLACEMENT. Reallocation causes significant and immediate inflation

Hugo **Morão 23** - PhD candidate in Economics at the Lisbon School of Economics & Management, winner of the Portuguese Global Management Challenge. “From Carbon Caps to Consumer Prices: The Economic Impact of Climate Policy in the Euro Area,” 07/07/23, USAEE Working Paper No. 23-592, https://dx.doi.org/10.2139/ssrn.4521515

Dr. Hugo Morao in 2023 finds that reducing emissions would have severe economic costs, by reducing employment and creating an investor shock, inflation and economic downturn would spread across the economy instantly.

Figure 4 depicts the **real effects** of climate policy by showing the **impulse response** functions of the Euro Area’s **macroeconomic variables** to the identified climate policy shock, normalized to increase the energy inflation by 1 percentage point on impact. The results show that reducing emissions in the fight against climate change can have **significant economic costs**. **Industrial production** experiences a significant **decline** for approximately two years and does not recover until the fifth year, while **unemployment** rates **rise** persistently. Costly **reallocation** frictions that occur in the economy are a common explanation for this in energy-related models.7 The real exchange rate slightly depreciates and recovers in less than one year. Interestingly, the trade deficit (as a percentage of GDP) persistently declines, in contrast to the real exchange rate. This effect can be attributed to a steeper decline in exports compared to imports, and it can serve as an argument in favor of a carbon border tax. For comparison purposes, it is also helpful to examine the peak responses of these variables. A carbon policy **shock** increases energy **inflation** by one percentage point and **general inflation** by 0.15 percentage points. It decreases industrial production by 0.1%, and the unemployment rate increases by 0.6 percentage points. The REER decreases by 0.8%, and the trade balance declines by 0.7% of GDP. In conclusion, these results demonstrate that European climate policy has significant impacts on the macroeconomy, with lower output and higher unemployment as **short-term consequences** of this policy. However, it can also lead to higher borrowing rates and uncertainty, as observed at the firm level by Bartram et al. (2022). 4.2 The effects on financial markets Figure 6 demonstrates that climate policy shocks **spread effectively** through the Euro Area stock and sovereign debt markets. Stock prices exhibit a slight increase initially but then experience a significant decline over the next two years8 and the volatility also increases9 . The sovereign markets are significantly affected as well, but credit conditions, measured by BBB spreads, are not significantly impacted.The policy rate experiences a **tightening** in the **short term**, which lasts up until the second year, while the size of ECB’s balance sheet, which is a measure of unconventional policy, does not change in response to the climate policy. Amplifying effects are present through the financial accelerator channel, but they are less pronounced compared to the real effects analyzed in the previous subsection. 4.3 Consumer prices The impact of a tightening in carbon policy on consumer prices is likely to vary across different categories and components of the HICP. Table 2 shows the 24-months cumulative and peak responses for the different categories and components of the HICP.10 As expected, energy inflation is the most sensitive to these shocks. The carbon price follows a humped pattern and lasts for about a year. Among the different categories of consumer goods, the pass-through is the most substantial for non-durables (1.23), semidurables (1.16), and durables (1.07). The services category exhibits the weakest response (0.62), although the difference is not as large as one might expect. When considering the individual components, the evidence is heterogeneous. Most components show **significant** and **persistent** responses in the short run, except for Communication, which initially exhibits a positive and significant response but then enters negative territory around the second year. The introduction of new technology can explain this phenomenon The Communications sector is highly reliant on long-term investments, and changes in carbon policy can induce new investments that improve efficiency and reduce the final price, thus offsetting the initial price increase. Among the different sub-components, the pass-through is highest for transportation (4.05), followed by housing (2.93) and food (2.43). The pass-through of the remaining components is relatively weak. Regarding peak responses, some sub-components such as Clothing, Recreation, and Culture stand out for their strong and rapid initial responses, although these effects tend to dissipate quickly. 4.4 Variance decomposition analysis To further analyze the impact of climate policy shocks on macroeconomic variables, I employed a forecast error variance decomposition (FEVD). Table 3 presents the percentage contribution of the climate policy shock to the variance of each variable at three different forecast horizons: 12 months, 24 months, and long-run (36 months). In the short term (12 months), climate policy shocks account for approximately 71% and 73% of the variance in headline and

energy inflation rates, respectively. This substantial portion demonstrates the **immediacy** of the effect of climate policy shocks on **inflation rates**. However, this contribution reduces over time. In the long term (36 months), the contribution of climate policy shocks to the variance declines to 54% for headline inflation and 59% for energy inflation. A plausible explanation for the dominant short-term contribution of climate policy shocks to inflation rates is the **rapid propagation** of energy-related shocks through the **production costs** of numerous goods and services, as highlighted earlier in the sectoral analysis. This emphasizes the **critical role** that energy prices and climate policy play in shaping the macroeconomic landscape. The impact of climate policy shocks on the four macroeconomic variables somewhat differs somewhat from the patterns observed for inflation. In general, climate policy shocks tend to explain a relatively small share of the variations in these variables in the short run, but their contribution increases at longer horizons. For instance, while the shocks explain only about 3% of the short-run variations in the unemployment rate, this contribution grows to almost 22% at the 36-months horizon. Similarly, the contribution of climate policy shocks to variations in the trade balance remains stable until the 36-month horizon. In contrast, the contributions to industrial production and REER rise, albeit from a small base. These results suggest that climate policy shocks can have persistent and significant impacts on certain macroeconomic variables, particularly at longer horizons, depending on the variable in question and the forecast horizon being considered.

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As an overview – commercial nuclear energy is infeasible in the US—issues like competition from other sources, construction delays, and legal battles over the large land use of nuclear energy makes it impossible

Hockenos '24 (Hockenos, Paul [Paul Hockenos is a Berlin-based journalist and author of Berlin Calling: A Story of Anarchy, Music, the Wall and the Birth of the New Berlin]. "Anatomy of a mess: the cautionary tale of the US's last mega nuclear reactor." Energy Transition, 2-15-2024, https://energytransition.org/2024/02/anatomy-of-a-mess-the-cautionary-tale-of-the-uss-last-mega-nuclear-reactor/)//Shwillett

The expansion of the Vogtle nuclear power plant in Burke County near Augusta, Georgia, stands as the only new atomic reactors built in the US in the last 30 years – and the most expensive power plant ever built on Earth. The story is one of chaos, broken promises, cost overruns and blown deadlines. So off the rails is this fiasco, it is most probably the last large-scale pressurized water reactor that will ever come online in the US – when it finally does. Indeed, no others are currently planned. Paul Hockenos reports.

When, in **2009**, Georgia Power and Westinghouse Electric received approval to build the third and fourth reactors of the Alvin W. Vogtle Electric Generating Plant, it **was the first contract for** new **nuclear development in the US since the 1979 Three Mile Island accident**. The upgrade, adding 2.5 GW capacity to Vogtle, would make it the largest nuclear generator in the country. The owners pledged that the units would begin producing electricity in 2016 – at a cost of $14 billion – pushing the share of nuclear energy in the nation's electricity mix to 19%, which is about 8% of US total energy use.

But those initial figures evaporated quickly. **Delays, cost recalculations, ownership battles and technical problems – typical of the industry over previous decades, whether in North America or Europe – propelled the starting date to 2023, and then 2024, and costs ballooned to almost $35 billion**. Today, local consumers are angry. It is they who will encounter extra costs in their electricity bills, and **regional utilities** under contract to buy Vogtle's power are up in arms and **fighting legal battles** to release them of obligation.

From the very beginning, it was clear that Georgia Power ratepayers would be paying a nuclear construction cost recovery tariff on their bills; the other co-owners – Oglethorpe Power Corp., Municipal Electric Authority of Georgia and Dalton Utilities – and their customers would pick up the rest. But as the delays, increases in costs (bureaucratic hurdles, wiring mistakes, redesign of the containment building, investor errors, switching of construction firms and safety issues) and cost recalculations began, **this tariff doubled.**

On Hegemony

1. **The US has already lost---the ship sailed and structural factors make catch-up impossible**

Zaremba '25 (Haley Zaremba [Haley Zaremba is a writer and journalist based in Mexico City. She has extensive experience writing and editing environmental features, travel pieces, local news in the Bay Area, and music/culture reviews.] "Why China is Winning the Nuclear Energy Race," Oil Price, 2-17-2025, https://oilprice.com/Alternative-Energy/Nuclear-Power/Why-China-is-Winning-the-Nuclear-Energy-Race.html)//Shwillett

China has lapped the rest of the world in terms of nuclear energy deployment, and now it has its gaze set on dominating the nuclear export sector as well. Though the United States has been the biggest nuclear power generator in the world for decades, the American market has significantly slowed in recent decades, with much of its ageing fleet facing **terminal decline**. Over the same period, China has doubled

down on nuclear energy buildout, adding a staggering 34 gigawatts of capacity over the last ten years. As a result, China is now set to overtake the United States (and France) to become the world's single biggest producer of nuclear energy within the next ten years. At the same time that China has been rapidly building out its nuclear power capacity, it has also been experimenting with many novel technologies. China has busily rolled out small modular reactors and high-temperature gas-cooled units while similar U.S. designs have **languished** in **regulation limbo**. And Beijing has even more ambitious nuclear energy prototypes in mind, including reactor models fueled by thorium instead of uranium. All of this is to say that the Chinese nuclear sector has **definitively cornered** global expertise on nuclear technologies and development. Though U.S. scientists have developed similar prototypes in theory, and often before Chinese markets began to consider them, China actually managed to build them and now boast a wealth of **experiential knowledge** that the West **cannot** seem to **keep pace** with. While the West is aware that it is losing the nuclear energy race, there's **little** that the United States or European Union countries **can do** to close the gap. China is able to build nuclear reactors in a **fraction of the time** and at a **fraction of the cost** compared to its Western would-be competitors. "The country's reactor developers are **state-owned** enterprises, and receive **preferential loans** with low interest rates," the Huffington Post recently reported. "That's a stark contrast from U.S. and European projects, which can **overrun** their **budgets** by billions of dollars each time a **regulatory delay** holds them up, sending **interest** on their loans soaring." The United States' newest nuclear reactor, Georgia's Plant Vogtle, finally fully came online on April 29, 2024, seven years late and $17 billion over budget. This makes it, by some accounts, the most expensive infrastructure project of any kind in U.S. history at a whopping $35 billion. And now that Vogtle is finally finished, there are currently zero nuclear reactors under construction in the United States.

On AI

1. **Renewables are better—AI and energy are synergistic and work together**

Johnson '24 (Mark Johnson [Mark Johnson is an experienced executive currently serving as Vice President of Operational Excellence at JERA Nex since January 2024. Prior to this role, Mark held the position of Director of Global Business Development at SSE Renewables from April 2021 to January 2024 and served as Chief Operating Officer at Equality Forward, a consultancy focused on inclusive workplaces, between September 2020 and April 2021.], "AI and Renewable Energy: A Complex but Critical Alliance," Renewable Energy Magazine, 9-23-2024, https://www.renewableenergymagazine.com/panorama/ai-and-renewable-energy-a-complex-but-20240923)//Shwillett

In the rapidly evolving global energy landscape, two important forces are emerging: **artificial intelligence** and **renewable energy**. At the intersection of technological innovation and environmental urgency, this **partnership** promises to **reshape** our approach to **energy production** and consumption. Demand for electricity is soaring, driven by digitalization, urbanization and the electrification of transport. Simultaneously, the need for decarbonization in the face of climate change has never been more apparent. Enter AI, a transformative technology with huge potential. However, while AI's problem-solving capabilities are undeniable, it's also creating new challenges, most notably an unprecedented appetite for electricity. As energy systems become more complex, there's a greater need for information sharing and more powerful tools to plan and operate these evolving systems. This is where the **synergy** between **AI** and **renewable energy** becomes not only beneficial, but **essential**. The scale of AI's energy consumption is staggering. Goldman Sachs Research estimates that by 2030, data center power demand will increase by 160%, with AI playing a major role in this rise. This emergence in demand presents a paradox: how can we support the growth of AI while meeting climate targets? The answer could lie in the very technology driving this increased demand. While AI is energy intensive, it also holds the key to **optimizing** renewable energy systems and **accelerating** the **energy transition**. Industry insiders argue that AI is driving the **construction** of renewable energy sources, particularly in the wind, solar and nuclear sectors. In addition, AI can **significantly improve** renewable energy infrastructure by increasing **efficiency** and **predictability**. .One of the most promising applications of AI in the

renewable energy sector is overcoming the challenge of **intermittency**. The intermittent nature of wind and solar power has **long** been a **barrier** to **widespread adoption**. AI-powered **predictive maintenance** and **grid management** systems are **revolutionizing** the way we manage these **fluctuations**, ensuring a **more stable** and **reliable** energy supply. **Battery storage**, critical to solving intermittency issues, is another area where AI is making **significant strides**. By **optimizing charge** and **discharge cycles** and **predicting** energy **demand patterns**, AI is helping to create more **efficient** and **effective** energy **storage** solutions. As we navigate this new landscape, it's clear that the success of both AI and renewable energy depends on their ability to **complement** and **support** each other. The renewable energy sector needs to scale up rapidly to meet the increasing demand from AI and other technologies. At the same time, AI-led innovation is key to **supercharging** the **efficiency** and **reliability** of our energy systems. The alliance between AI and renewable energy represents a pivotal moment in our journey towards a sustainable future. While challenges remain, the potential benefits of this partnership are immense. By harnessing the power of AI to **optimize** renewable energy systems, we can create a more efficient, reliable and sustainable **energy infrastructure capable** of meeting the **demands** of our increasingly digital world.

2. AI development is a private investment game and its already happening.

Anjum and Bharucha '25 (Meerub Anjum [S&P 500 News Writer, CEO & Climate Change Communicator, Financial Journalist, Communications Officer.], Neel Hiteshbhai Bharucha [Data Associate - Central Data at S&P Global Market Intelligence · Experience: S&P Global · Education: B.K. School Of Business Management.], "Private equity flows to advanced nuclear companies hit record high in 2024," S&P 500, 2-4-2025, https://www.spglobal.com/market-intelligence/en/news-insights/articles/2025/2/private-equity-flows-to-advanced-nuclear-companies-hit-record-high-in-2024-87302728)//Shwillett

Private equity and **venture capital** investments in advanced nuclear companies in **2024 surpassed** the **total** deal value of the past **15 years combined**, driven by **demand** for energy to power the **rapid advancement** of **AI**. **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. The number of deals doubled in 2024 compared to 2023. The **data** includes companies developing **next-generation** nuclear **technologies**, such as **small modular reactors**, Generation III+ reactors, and high-assay low-enriched uranium fuel technologies. It also covers developers of **smaller**, **lower-capacity reactors**. <<<FIGURE OMITTED>>> AI power demand speeds investment The demand for energy to power the **datacenters** that host AI has **significantly increased** the **interest** of private equity firms in advanced **nuclear**, a market these firms have not traditionally focused on, Jeffrey Merrifield, partner at Pillsbury Winthrop Shaw Pittman LLP, told Market Intelligence. "There are a variety of potential deals that are underway where the members of the datacenter and AI community are looking at direct investment in advanced reactor technologies. That has certainly piqued the interest of a variety of folks in private equity," Merrifield said. The **deployment** of nuclear reactors is **shifting** from utilities to the petrochemical, **manufacturing** and **AI** sectors, Merrifield said. Growing confidence in nuclear energy is set to drive growth in advanced nuclear, and "the AI community is going to provide the **foundation** for [**demand**] **stability** that it needs," Merrifield said. A catalyst has been the **big tech** firms, which are **pouring money** into advanced nuclear to meet their AI and datacenter electricity **demand**. Alphabet Inc. partnered with Kairos Power LLC, an advanced nuclear reactor developer, to deploy 500 megawatts by 2030. Meanwhile, Amazon.com Inc. partnered with X Energy and Dominion Energy Inc. on reactor projects, and Meta Platforms Inc. seeks up to 4 gigawatts of nuclear power by early 2030 for its AI electricity demand. "There was a **huge amount** of **support** from the tech industry for nuclear — because the tech industry has **very large projected** energy **demands**," James Walker, CEO of Nano Nuclear Energy Inc., told Market Intelligence.