We affirm Resolved: the US should substantially increase investment in domestic nuclear energy.

Energy demand is growing and fossil fuels are filling the gap

Renews 24 [Renews, "'Renewables failing to keep pace with energy demand'", 04/01/2024, reNEWS - Renewable Energy News, https://renews.biz/92255/renewables-failing-to-keep-pace-with-energy-demand/, Accessed 04/04/2025] //IA

Growing leadership and appetite for renewables in developing countries is clear, but finance remains a major obstacle, it found. Renewables are increasing in the overall energy mix, but they are not replacing coal, oil and gas at the required pace for various reasons: the overall demand for energy is rising fast, renewable energy projects are significantly more expensive in developing countries and[facing issues with] large bottlenecks persist in permitting, infrastructure and connecting renewables to grids. This is the main message of the GSR 2024 report released today. As the first module in a series to be unveiled during the year, the Global Overview provides the big picture status of renewables in the wider energy system and in the context of global challenges such as climate change, economic development and the geopolitical landscape. "The world is burning more fossil fuels than ever before, global energy-related emissions are increasing, and ever-growing energy demand is not being fully met by renewables," said REN21 executive director Rana Adib (pictured). "This is aggravating the climate crisis and derailing the energy transition. We are missing the opportunity to build resilient and inclusive societies by fully deploying the economic opportunities that renewables provide. "We must also make rapid gains in energy efficiency to make best use of the energy we consume." Renewable energy use surged 58% between 2012 and 2022, but overall energy demand also grew 16% during this period, said the report. The increase in demand has been met mostly by coal, oil, and fossil gas, which together accounted for around 65% of energy consumption growth between 2012 and 2022.

And renewables are failing to meet promises, Renews continues

Renews 24 [Renews, "'Renewables failing to keep pace with energy demand'", 04/01/2024, reNEWS - Renewable Energy News, https://renews.biz/92255/renewables-failing-to-keep-pace-with-energy-demand/, Accessed 04/04/2025] //IA

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All the while, nuclear energy is struggling to compete with fossil fuels

WNA 24 (WNA, 8-27-2024, Nuclear Power in the USA, No Publication, https://world-nuclear.org/information-library/country-profiles/countries-t-z/usa-nuclear-power, Accessed 4-1-2025, wayway)

The USA is the world's largest producer of nuclear power, accounting for about 30% of worldwide generation of nuclear electricity. The country's nuclear reactors produced 772 TWh in 2022, 18% of total electrical output. Vogtle 3 was connected to the grid in April 2023, followed by unit 4 in March 2024. The Inflation Reduction Act was signed into law in August 2022. The Act provides support for existing and new nuclear development through investment and tax incentives for both large existing nuclear plants and newer advanced reactors, as well as high-assay low enriched uranium (HALEU) and hydrogen production. **Some states have liberalized wholesale electricity markets, which makes the financing of capital-intensive power projects difficult, and coupled with lower gas prices since 2009, have put the economic viability of some existing reactors and proposed projects in doubt.** 94 Operable Reactors 96,952 MWe 0 Reactors Under Construction 0 MWe 41 Reactors Shutdown 20,017 MWe Operable nuclear power capacity Electricity sector Total generation (in 2022): 4502 TWh Generation mix: natural gas 1742 TWh (39%); coal 909 TWh (20%); nuclear 804 TWh (18%); wind 440 TWh (10%); hydro 286 TWh (6%); solar 189 TWh (4%); biofuels & waste 66.8 TWh; oil 41.5 TWh; geothermal 19.6 TWh. Import/export balance: 41.2 TWh net import (56.9 TWh imports; 15.7 TWh exports) Total consumption: 4071 TWh Per capita consumption: c. 12,000 kWh in 2022 Source: International Energy Agency and The World Bank. Data for year 2022. In its Annual Energy Outlook 2022, the US Energy Information Administration's (EIA's) reference case shows electricity demand growth averaging 1% per year through to 2050. Nuclear power plays a major role in electricity provision across the country. The US fleet is operated by 30 different power companies across 30 different states. Since 2001 these plants have achieved an average capacity factor of over 90%. The average capacity factor has risen from 50% in the early 1970s, to 70% in 1991, and it passed 90% in 2002, remaining at around this level since. In 2019 it was a record 94%, compared with wind (32%) and solar PV (22%) (EIA data). The industry invests about $7.5 billion per year in maintenance and upgrades of the plants. Given that nuclear plants generate nearly 20% of the nation's electricity overall and about 55% of its carbon-free electricity, even a modest increase in electricity demand would require significant new nuclear capacity in order to maintain this share. If today's nuclear plants retire after 60 years of operation, 22 GWe of new nuclear capacity would be needed by 2030, and 55 GWe by 2035 to maintain a 20% nuclear share. **Since about 2010 the prospect of sustained low natural gas prices has dampened plans for new nuclear capacity (see section on New nuclear capacity below).** A table of operable plants in the USA is available as an appendix to this page. **Almost all the US nuclear generating capacity comes from reactors built [before 1990] between 1967 and 1990. Until 2013 there had been no new construction starts since 1977, largely because for a number of years gas generation was considered more economically attractive** and because construction schedules during the 1970s and 1980s had frequently been extended by opposition, and compounded by heightened safety fears following the Three Mile Island accident in 1979. A further PWR – Watts Bar 2 – started up in 2016 following Tennessee Valley Authority's (TVA's) decision in 2007 to complete the construction of the unit. Despite a near halt in new construction for more than 30 years, US reliance on nuclear power has grown. In 1980, nuclear plants produced 251 TWh, accounting for 11% of the country's electricity generation. In 2019, that output had risen to 809 TWh and nearly 20% of electricity, providing more than 30% of the electricity generated from nuclear power worldwide. Much of the increase came from the 47 reactors, all approved for construction before 1977, that came online in the late 1970s and 1980s, more than doubling US nuclear generation capacity. The US nuclear industry has also achieved remarkable gains in power plant utilisation through improved refuelling, maintenance and safety systems at existing plants. Average nuclear generation costs have come down from $51.22/MWh in 2012 to $30.92/MWh in 2022. This 40% reduction in nuclear generating costs since 2012 has been driven by: a 41% decrease in fuel costs; a 51% decrease in capital expenditures; and a 33% decrease in operating costs.9

Critically, nuclear energy is only expensive now because the US has mishandled it.

Brad Plumer from Vox explains, 2-29-2016 // // Why America abandoned nuclear power (and what we can learn from South Korea) // https://www.vox.com/2016/2/29/11132930/nuclear-power-costs-us-france-korea // accessed 4-4-2025 // ashe

But there's also an optimistic story for nuclear — and one that I think is worth hearing out. A recent paper in the journal Energy Policy by Jessica Lovering, Arthur Yip, and Ted Nordhaus of the Breakthrough Institute looked at construction costs for hundreds of reactors built in the US, France, Canada, Japan, German, India, and South Korea between 1960 and 2010. Their data tells a more nuanced story. **Nuclear** construction **costs in the US did spiral out of control**, especially **after the Three Mile Island meltdown in 1979**. **But** this wasn't universal. **Countries like France, Japan, and Canada kept costs** fairly **stable** during this period. **And South Korea** actually **drove nuclear costs down**, at a rate similar to what you see for solar. Studying these countries can offer lessons for how to make nuclear cheaper — so that it can become a useful clean energy resource around the world. "The biggest thing we found is that **there's nothing intrinsic to nuclear that leads to cost escalations**," Lovering told me. "**It depends on** what **policies** are in place, on the market dynamics. You get very different cases in different countries."

Which is why the Energy Information Administration finds in 2023, that because of low US government investment,

US EIA 23 (Energy Information Administration, 8-1-2023, U.S. nuclear industry, https://www.eia.gov/energyexplained/nuclear/us-nuclear-industry.php, Accessed 4-4-2025, wayway)

There are 54 nuclear power plants operating in the United States Electricity generation from commercial nuclear power plants in the United States began in 1958. As of August 1, 2023, the United States had 93 operating commercial nuclear reactors at 54 nuclear power plants in 28 states. The average age of these nuclear reactors is about 42 years old. The oldest operating reactor, Nine Mile Point Unit 1 in New York, began commercial operation in December 1969. The newest reactor to enter commercial service is Unit 3 at the Alvin W. Vogtle Electric Generating Plant in Georgia, which began commercial operation on July 31, 2023, and is the first reactor to come online since Watts Bar 2 was commissioned in 2016. The number of operating U.S. nuclear reactors peaked at 112, and their combined net summer electricity generation capacity was 99,624 megawatts. The number of operating reactors declined to 104 in 1998 and remained there through 2013. The number declined to 92 operating reactors in 2022. Total U.S. nuclear net summer electricity generation capacity peaked in 2012 at about 102,000 MW and declined to 94,765 MW in 2022. Although though the number of reactors has declined since 2012, power plant uprates—modifications to increase capacity—at individual nuclear power plants have made it possible for the entire operating nuclear reactor fleet to maintain high capacity-utilization rates (or capacity factors). These relatively high capacity factors helped nuclear power to provide 19%–20% of total annual U.S. electricity generation from 1990 through 2021. Some reactors also increased annual electricity generation by shortening the length of time reactors are offline for refueling. **Nuclear reactors are decommissioned after they are retired from commercial service. According to the U.S. Nuclear Regulatory Commission, 22 commercial nuclear power reactors at 18 sites are in various stages of decommissioning.**

To prevent this, we affirm the resolution: the US should substantially increase its investment in domestic nuclear energy.

Affirming solves through upgrades. Tariq 24

Tariq, Ehtesham. "Costs and Benefits of Extending Aging Nuclear Power Plants | Certrec." Certrec | Regulatory & Technology Solutions for the Energy Industry, December 2, **2024**. https://www.certrec.com/blog/costs-and-benefits-of-extending-aging-nuclear-power-plants/. [Certrec is a leading provider of regulatory compliance and digital integration solutions for the energy industry, with the mission of helping ensure a stable, reliable, bulk electric supply. Since 1988, Certrec's innovation combined with industry expertise has helped hundreds of power-generating facilities manage their regulatory compliance with both the Nuclear Regulatory Commission (NRC) and North American Electric Reliability Corporation (NERC) and reduce their risks.] //MH

For several decades, nuclear power plants worked as a cornerstone of global energy strategies, providing reliable and carbon-free electricity to millions in the U.S. However, as many nuclear reactors approach the end of their initial design lives, questions arise about whether to decommission them or extend their operational lifespan. Aging nuclear power plants, though still a vital asset in many energy grids, face mounting challenges that require careful consideration. Extending the life of aging nuclear power plants involves a complex evaluation of costs, safety considerations, technological advancements, and socio-economic benefits. This decision-making process carries immense implications for energy security, climate goals, and financial investments. The Economic Rationale for Life Extension Projects The economics of extending the operational life of aging nuclear reactors is one of the primary drivers behind life extension projects. **Constructing new nuclear plants is a capital-intensive endeavor, often requiring billions of dollars and spanning a decade or more. In contrast, extending the life of an existing plant through life management programs, such as refurbishment and equipment upgrades, generally costs [little] significantly less.** According to the International Atomic Energy Agency (IAEA), life extension projects can cost 25–50% of the expenses of building a new plant, making them a cost-effective solution for maintaining energy supply. Operational costs are another favorable factor. Aging nuclear plants often operate at lower marginal costs than alternative energy sources, especially fossil fuels. **With upgrades in key systems, such as steam generators, turbines, and safety measures, older plants can achieve higher efficiencies, further driving down costs.** However, these financial **benefits come with** upfront investments in safety assessments, regulatory compliance, and **infrastructure modernization to meet evolving industry standards**. Safety Upgrades and Regulatory Challenges Safety is paramount in any discussion about extending the lifespan of nuclear power plants. **Aging infrastructure poses increased risks, necessitating comprehensive safety evaluations and enhancements. Life extension projects typically involve extensive inspections, including assessments of reactor pressure vessels, containment systems, and**

cooling mechanisms to identify potential vulnerabilities. Advanced nondestructive testing methods are often employed to detect micro-cracks, corrosion, and material degradation that might compromise safety during extended operations. Meeting regulatory requirements from the Nuclear Regulatory Commission (NRC) presents additional challenges. Governments and nuclear safety agencies like the NRC require rigorous assessments to ensure that extended operations do not compromise public health or the environment. This involves implementing post-Fukushima safety measures, such as improved flood protection, enhanced seismic resilience, and backup power systems. These safety upgrades, while necessary, can significantly increase the costs and time required for life extension projects. Social and Energy Security Implications The socio-economic and energy security implications of extending the life of nuclear plants are profound. **These plants provide thousands of high-paying jobs, from engineers and technicians to plant operators and support staff.** Life extension projects, which require extensive maintenance and upgrades, often create additional employment opportunities in the local community. On the energy security front, extending nuclear plant operations reduces dependence on imported fossil fuels and mitigates price volatility in energy markets. Countries with aging nuclear fleets, such as the United States, France, and Canada, view life extension as a strategic move to maintain energy independence and secure supply chains. Conclusion The decision to extend the life of aging nuclear power plants is a multifaceted challenge involving economic, technical, environmental, and social considerations. While life extension offers significant benefits, including cost savings, enhanced energy security, and climate mitigation, it also demands substantial investments in safety upgrades, regulatory compliance, and public trust. By balancing these factors and leveraging advancements in nuclear technology, nations can ensure the safe and sustainable operation of nuclear power plants, paving the way for a cleaner and more secure energy future.

This produces three benefits

First, upgrades prevents accidents

Upgrades improve safety. Tariq 24

Tariq, Ehtesham. “Costs and Benefits of Extending Aging Nuclear Power Plants | Certrec.” Certrec | Regulatory & Technology Solutions for the Energy Industry, December 2, **2024**. https://www.certrec.com/blog/costs-and-benefits-of-extending-aging-nuclear-power-plants/. [Certrec is a leading provider of regulatory compliance and digital integration solutions for the energy industry, with the mission of helping ensure a stable, reliable, bulk electric supply. Since 1988, Certrec’s innovation combined with industry expertise has helped hundreds of power-generating facilities manage their regulatory compliance with both the Nuclear Regulatory Commission (NRC) and North American Electric Reliability Corporation (NERC) and reduce their risks.] //MH

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And the risk of meltdowns is going up now Maness 25

Maness 25 [Coleman Maness, Director of sales and marketing at ARES Security Corporation, 2-24-2025, "Enhancing Nuclear Security in an Era of Rising Threats", ARES Security, https://aressecuritycorp.com/2025/02/24/enhancing-nuclear-security-in-an-era-of-rising-threats/, accessed 4-4-2025.] //aayush

As global tensions and cybersecurity threats escalate, **nuclear security remains a top priority for governments** and energy providers. This blog explores recent updates in nuclear security regulations, advancements in security technology, and **best practices for protecting nuclear facilities against physical and cyber threats**. Current Threat Landscape in Nuclear Security **With evolving geopolitical threats, nuclear facilities face increasing risks from cyberattacks, insider threats, and unauthorized drone surveillance**. **Recent attempts to breach nuclear plants have emphasized the need for robust perimeter security and advanced monitoring** systems. The **increasing threat of state-sponsored cyberattacks targeting nuclear reactors** highlights the necessity of multi-layered cybersecurity protocols. **The NRC's latest assessments emphasize the need for real-time monitoring, automated threat detection, and rapid response capabilities** to prevent security breaches. Regulatory Developments and Compliance Requirements The Nuclear Regulatory Commission (**NRC**) **has introduced new cybersecurity frameworks for nuclear facilities, emphasizing compliance with regulations** such as 10 CFR Part 73. **Facilities must implement multi-layered security systems and continuous risk assessment protocols**. The Department of Energy (**DOE**) has **also increased funding for cybersecurity enhancements in nuclear energy facilities**, further reinforcing national security priorities. **Strengthening Nuclear Security Through Innovation** and Vigilance **Ensuring nuclear security requires continuous innovation and adherence to regulatory requirements**. **By integrating advanced security solutions and staying ahead of emerging threats, nuclear facilities can maintain operational resilience and public safety**. As the nuclear industry expands, **proactive security frameworks will remain essential** in mitigating evolving threats and ensuring long-term sustainability.

And regulations are going down

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

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 Nuclear Regulatory Commission—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?

Accidents affect millions

Richard **Gray 19** (Richard Gray, 7-25-2019, The true toll of the Chernobyl disaster, No Publication, https://www.bbc.com/future/article/20190725-will-we-ever-know-chernobyls-true-death-toll, Accessed 4-4-2025, wayway)

According to the official, internationally recognised death toll, just 31 people died as an immediate result of Chernobyl while the UN estimates that only 50 deaths can be directly attributed to the disaster. In 2005, it predicted a further 4,000 might eventually die as a result of the radiation exposure. **Brown's research, however, suggests Chernobyl has cast a far longer shadow.** "When I visited the wool factory in Chernihiv, I met some of the women who were working at the time," she says. "There were just 10 of these women still there. They told me that they were picking up bales of wool and sorting them on tables. In May 1986, the factory was getting wool that had radiation readings of up to 30Sv/hr. The bales of wool the women were carrying were like hugging an X-ray machine while it was turned on over and over again." Getty Images The Ukrainian government pays benefits to more than 36,000 widows of men who have died as a result of the Chernobyl disaster (Credit: Getty Images)Getty Images The Ukrainian government pays benefits to more than 36,000 widows of men who have died as a result of the Chernobyl disaster (Credit: Getty Images) **Thousands of animals were slaughtered in the area around Chernobyl as it was being evacuated.** Brown believes fleeces from some of these animals appear to have found their way to the factory in Chernihiv along with other contaminated wool from farms enveloped in the clouds of radioactive material that spread out across northern Ukraine. When Brown spoke to the 10 "liquidators" at the wool factory, their stories gave a grim picture of what appears to have happened all across the region as ordinary people who had nothing to do with the clean-up of the disaster were exposed to radioactive material. "They pointed to different parts of their bodies that had aged more than the rest and where they had health problems," says Brown. "They knew all about which radioactive isotopes had lodged in their organs." The other 288 women, they told her, had either died or had taken pensions for ill health. **In the weeks and months that followed the Chernobyl disaster, hundreds of thousands of firefighters, engineers, military troops, police, miners, cleaners and medical personnel were sent into the area immediately around the destroyed power plant in an effort to control the fire and core meltdown, and prevent radioactive material from spreading further into the environment. These people – who became known as "liquidators" due to the official Soviet definition of "participant in liquidation of the Chernobyl nuclear power plant accident consequences" – were given a special status that meant they would receive benefits such as extra healthcare and payments. Official registries indicate that 600,000 people were granted liquidator status.** Getty Images Thirty one engineers, firemen and emergency clean-up workers are officially recognised as dying in the first three months after the explosion (Credit: Getty Images)Getty Images Thirty one engineers, firemen and emergency clean-up workers are officially recognised as dying in the first three months after the explosion (Credit: Getty Images) **But a contentious report published by members of the Russian Academy of Sciences indicates that there could have been as many as 830,000 people in the Chernobyl clean-up teams. They estimated that between 112,000 and 125,000 of these – around 15% – had died by 2005. Many of the figures in the report, however, were disputed by scientists in the West, who questioned their scientific validity.** The Ukrainian authorities, however, kept a registry of their own citizens affected by the Chernobyl accident. In 2015 there were 318,988 Ukrainian clean-up workers on the database, although according to a recent report by the National Research Centre for Radiation Medicine in Ukraine, 651,453 clean-up workers were examined for radiation exposure between 2003 and 2007. A similar register in Belarus recorded 99,693 clean-up workers, while another registry including included 157,086 Russian liquidators. **In Ukraine, death rates among these brave individuals has soared, rising from 3.5 to 17.5 deaths per 1,000 people between 1988 and 2012. Disability among the liquidators has also soared. In 1988 68% of them were regarded healthy, while 26 years later just 5.5% were still healthy. Most – 63% – were reported to be suffering from cardiovascular and circulatory diseases while 13% had problems with their nervous systems. In Belarus, 40,049 liquidators were registered to have cancers by 2008 along with a further 2,833 from Russia.** The International Atomic Energy Agency, however, says that health studies on liquidators have "failed to show any direct correlation between their radiation exposure" and cancer or other disease. Some of those living closest to the power plant received internal radiation doses in their thyroid glands that were up to 37,000 times the dose of a chest x-ray Another group who bore the brunt of the radiation exposures in the hours and days after the explosion were those living in the nearby town of Pripyat and the surrounding area. It took a day and a half before the evacuation began and led to 49,614 people being evacuated. Later a further 41,986 people were evacuated from another 80 settlements in a 30km (18.7 mile) zone around the power plant, but ultimately some 200,000 people are thought to have been relocated as a result of the accident. Some of those living closest to the power plant received internal radiation doses in their thyroid glands of up to 3.9Gy – roughly 37,000 times the dose of a chest x-ray – after breathing radioactive material and eating contaminated food. Doctors who have been studying the evacuees report that mortality among the evacuees has gradually increased, reaching a peak in 2008-2012 with 18 deaths per 1,000 people. But this still represents a small proportion of the people affected by Chernobyl. Getty Images Almost 100,000 people were evacuated from the area around Chernobyl in the months after the disaster but today the abandoned towns attract tourists (Credit: Getty Images)Getty Images Almost 100,000 people were evacuated from the area around Chernobyl in the months after the disaster but today the abandoned towns attract tourists (Credit: Getty Images) Brown has found evidence hidden in hospital records from around the time of the accident that show just how widespread problems were. **"In hospitals throughout the region and as far away as Moscow, people were flooding in with acute symptoms," she says. "The accounts I have indicate at least 40,000 people were hospitalised in the summer after the accident, many of them women and children."** Political pressure is widely thought to have led to the true picture of the problem to be suppressed by the Soviet authorities, who were keen not to lose face on the international stage. But following the collapse of the USSR and as people living in the areas that were exposed to radiation begin to present with a wide range of health problems, a far clearer picture of the toll taken by the disaster is emerging. The Chernobyl disaster is the largest anthropogenic disaster in the history of humankind Viktor Sushko, deputy director general of the National Research Centre for Radiation Medicine (NRCRM) based in Kiev, Ukraine, describes the Chernobyl disaster as the "largest anthropogenic disaster in the history of humankind". The NRCRM estimate around five million citizens of the former USSR, including three million in Ukraine, have suffered as a result of Chernobyl, while in Belarus around 800,000 people were registered as being affected by radiation following the disaster. Even now the Ukrainian government is paying benefits to 36,525 women who are considered to be widows of men who suffered as a result of the Chernobyl accident. **As of January 2018, 1.8 million people in Ukraine, including 377,589 children, had the status of victims of the disaster, according to Sushko and his colleagues. There has been a rapid increase in the number of people with disabilities among this population, rising from 40,106 in 1995 to 107,115 in 2018.**

The 2nd impact is climate change

Improving nuclear energy reduces emissions. Kharecha and Hansen 13

Pushker Kharecha and James Hansen 13 observe, 4-22-2013, "Coal and gas are far more harmful than nuclear power – Climate Change: Vital Signs of the Planet," Climate Change: Vital Signs of the Planet, https://climate.nasa.gov/news/903/coal-and-gas-arefar-more-harmful-than-nuclear-power/

Likewise, we calculated that nuclear power prevented an average of 64 gigatonnes of CO_2-equivalent ($GtCO_2$-eq) net GHG emissions globally between 1971-2009 (see Fig. 3). This is about 15 times more emissions than it caused. It is equivalent to the past 35 years of CO_2 emissions from coal burning in the U.S. or 17 years in China (ref. 3) — i.e., **historical nuclear energy production has prevented the building of hundreds of large coal-fired power plants.** To compute potential future effects, we started with the projected nuclear energy supply for 2010-2050 from an assessment made by the UN International Atomic Energy Agency that takes into account the effects of the Fukushima accident (ref. 4). We assume that the projected nuclear energy is canceled and replaced entirely by energy from either coal or natural gas. We calculate that this nuclear phaseout scenario leads to an average of 420,000-7 million deaths and 80-240 $GtCO_2$-eq emissions globally (the high-end values reflect the all coal case; see Figs. 1 and 3). This emissions range corresponds to 16-48% of the "allowable" cumulative CO_2 emissions between 2012-2050 if the world chooses to aim for a target atmospheric CO_2 concentration of 350 ppm by around the end of this century (ref. 5). In other words, **projected nuclear power could reduce the CO_2 mitigation burden for meeting this target by as much as 48%.**

Reducing climate change is key, every degree matters.

Cassella 23 [Carly Cassella, 8-30-2023, "Scientists Warn 1 Billion People on Track to Die From Climate Change," ScienceAlert, https://www.sciencealert.com/scientists-warn-1-billion-people-on-track-to-die-from-climate-change] //clairec

The fossil fuels that humanity burns today will be a death sentence for many lives tomorrow. A recent review of 180 articles on the human death rate of climate change has settled on a deeply distressing number. Over the next century or so, conservative estimates suggest a **billion people could die from climate** catastrophes, possibly more. As with most predictions for the future, this one is based on several assumptions. One is a rough rule of thumb called the '1000-ton rule'. Under this framework, **every thousand tons of carbon that humanity burns is said to indirectly condemn a future person to death.** If the world reaches temperatures 2°C above the average global preindustrial temperature, which is **what we are on track for in the coming decades, then that's a lot of lives lost. For every 0.1 °C degree of warming from now on, the world could suffer roughly 100 million deaths**. "If you take the scientific consensus of the 1,000-ton rule seriously, and run the numbers, anthropogenic global warming equates to a **billion premature dead bodies over the next century**," explains energy specialist Joshua Pierce from the University of Western Ontario in Canada. "Obviously, we have to act. And we have to act fast." The human death rate from climate change is extremely tricky to calculate, even in the present day. The United Nations reports that every year, environmental factors take the lives of about 13 million people, and yet it's not clear how many of these deaths are directly or indirectly due to climate change. Some experts argue abnormal temperatures on their own may already claim as many as five million lives a year. Other estimates are much lower. Part of the problem is that the global effects of climate change are manifold. Crop failures, droughts, flooding, extreme weather, wildfires, and rising seas can all impact human lives in subtle and complex ways. Predicting the future death toll of these climate catastrophes is inherently imperfect work, but Pierce and his coauthor, Richard Parncutt from the University of Graz in Austria, think it's worth pursuing. They argue measuring emissions in terms of human lives makes the numbers easier for the public to digest, while also underlining how unacceptable our current inaction is.

Therefore, it’s imperative you affirm

James **Dinneen**. "Can Aging U.S. Nuclear Power Plants Withstand More Extreme Weather?" Yale E360, **2024**. https://e360.yale.edu/digest/u.s.-nuclear-power-climate-change. [Yale Environment 360 is an online magazine offering opinion, analysis, reporting, and debate on global environmental issues. We feature original articles by scientists, journalists, environmentalists, academics, policymakers, and business people, as well as multimedia and a daily digest of major environmental news.] //MH

To reach its climate goals, the Biden administration aims to extend the lives of U.S. nuclear reactors. But a new report finds regulators have not studied whether increasingly extreme weather could threaten the safety or viability of power plants largely built in the 1970s and 1980s. On August 10, 2020 a powerful derecho windstorm blasted the Duane Arnold nuclear power plant in Iowa. Up to 130 mile-per-hour winds caused a power outage and knocked over the 50-year-old plant's wooden cooling towers, which triggered an automatic shutdown of the reactor and a switch to backup generators to power its cooling system. The U.S. Nuclear Regulatory Commission (NRC) concluded the plant's multiple layers of defense had avoided any risk of releasing radioactive material, but the reactor was never restarted. The plant had been slated to close, and its owner decided not to repair the damage. "A weather-related event prematurely and permanently shut down the Duane Arnold," says Jeff Mitman, a nuclear risk consultant and a former NRC engineer now involved in a campaign to highlight safety risks at aging nuclear plants. He points to Duane Arnold as an example of how such plants can be vulnerable to extreme natural hazards that may be exacerbated by climate change. The country's 54 nuclear power plants still in operation were designed to be resilient to numerous outside threats, including the most extreme weather-related events deemed feasible based on the historical record, and even beyond. **But most plants were built more than 40 years ago, and a new investigation finds these plants may yet be vulnerable to unprecedented hazards fueled by climate change, at a time when many experts say nuclear power is needed to keep emissions from fossil fuels in check. According to the report released earlier this month by the U.S. Government Accountability Office (GAO), the investigative arm of Congress, every nuclear plant in the country is located in an area where climate change is set to worsen flooding, heat, storms, wildfires, extreme cold, or some combination. However, it found that the NRC — which is responsible for U.S. nuclear safety — has not conducted the analyses necessary to know whether nuclear power plants are prepared for those changing conditions.** The report did not demonstrate that any plants are necessarily vulnerable to these hazards, which would require a plant-by-plant analysis. But it found the NRC has not adequately addressed whether more extreme weather could force plants to shut down or lower power output more frequently, or pose a safety risk.

Thus,

The US Energy Info Administration finds , No Publication, 4-8-20**22** // // U.S. nuclear electricity generation continues to decline as more reactors retire // https://www.eia.gov/todayinenergy/detail.php?id=51978 // accessed 3-28-2025 // ashe

In 2021, **for the second consecutive year, U.S. nuclear** electricity **generation declined**. Output from U.S. nuclear power plants totaled 778 million megawatthours in 2021, or 1.5% less than the previous year. Nuclear's share of U.S. electricity generation **across all sectors** in 2021 was similar to its average share in the previous decade: **19%. Six nuclear** generating **units** with a total capacity of 4,736 megawatts (MW) **have retired since the end of 2017**. Three more reactors with a combined 3,009 MW of capacity are scheduled to retire in the coming years: Michigan's Palisades is scheduled to retire later this year, and California's Diablo Canyon is slated to retire one generating unit in 2024 and one in 2025. We compile announced retirement dates and new plants' intended online dates in our Preliminary Monthly Electric Generator Inventory.

Indeed, power plants are closing down

US EIA 23 (Energy Information Administration, 8-1-2023, U.S. nuclear industry, https://www.eia.gov/energyexplained/nuclear/us-nuclear-industry.php, Accessed 4-4-2025, wayway)

There are 54 nuclear power plants operating in the United States Electricity generation from commercial nuclear power plants in the United States began in 1958. As of August 1, 2023, the United States had 93 operating commercial nuclear reactors at 54 nuclear power plants in 28 states. The average age of these nuclear reactors is about 42 years old. The oldest operating reactor, Nine Mile Point Unit 1 in New York, began commercial operation in December 1969. The newest reactor to enter commercial service is Unit 3 at the Alvin W. Vogtle Electric Generating Plant in Georgia, which began commercial operation on July 31, 2023, and is the first reactor to come online since Watts Bar 2 was commissioned in 2016. The number of operating U.S. nuclear reactors peaked at 112, and their combined net summer electricity generation capacity was 99,624 megawatts. The number of operating reactors declined to 104 in 1998 and remained there through 2013. The number declined to 92 operating reactors in 2022. Total U.S. nuclear net summer electricity generation capacity peaked in 2012 at about 102,000 MW and declined to 94,765 MW in 2022. Although though the number of reactors has declined since 2012, power plant uprates—modifications to increase capacity—at individual nuclear power plants have made it possible for the entire operating nuclear reactor fleet to maintain high capacity-utilization rates (or capacity factors). These relatively high capacity factors helped nuclear power to provide 19%–20% of total annual U.S. electricity generation from 1990 through 2021. Some reactors also increased annual electricity generation by shortening the length of time reactors are offline for refueling. **Nuclear reactors are decommissioned after they are retired from commercial service. According to the U.S. Nuclear Regulatory Commission, 22 commercial nuclear power reactors at 18 sites are in various stages of decommissioning.**

Right now, the American nuclear energy fleet is set to decay. Hernandez 23 , 5-1-2023, Sustaining U.S. Nuclear Power Plants Could be Key to Decarbonization, https://www.pnnl.gov/news-media/sustaining-us-nuclear-power-plants-could-be-key-decarbonization// S V��

As the world races to discover solutions for reaching net zero, Kim's report quantifies the economic value of bringing the existing **nuclear** fleet into the year 2100 and outlines its significant contributions in limiting global warming. **Plants slated to close by 2050 could be among the most important players in a challenge that requires all carbon-free technology** solutions that are available—emerging and existing—the report finds. New nuclear technology also has a part to play, and its contributions could be boosted by driving down construction costs. "Even modest reductions in capital costs could bring big climate benefits," said Kim. "Significant effort has been incorporated into the design of advanced reactors to reduce the use of all materials in general, such as concrete and steel, because that directly translates into reduced costs and carbon emissions." The nuclear power fleet in the United States consists of 93 operating reactors across 28 states. **Most of these plants were constructed and deployed between 1970-1990. This means half of the fleet has outlived its original operating license lifetim**e of 40 years. While most reactors have had their licenses renewed for an additional 20 years, and some for yet another 20, the total number of reactors that will receive a lifetime extension to operate a full 80 years from deployment is uncertain. Other countries also rely on nuclear energy. In France, for example, nuclear energy provides 70 percent of the country's power supply. They and other countries will also have to consider whether to extend the lifetime, retire, or build new, modern reactors. However, **the U.S. faces the potential retirement of a bulk of reactors in a short period of time—this could have a far stronger impact than the staggered closures other countries may experience**. "Our existing nuclear power plants are aging and with their current 60-year lifetimes, **nearly all of them will be gone by 2050**. It's ironic. We have a net zero goal to reach by 2050, yet our single largest source of carbon-free electricity is at risk of closure," said Kim.

Rebuttal

In their case, they talked about a new reactor costing nearly 10 billion dollars:
The US' current idea of investment is not to build new reactors, but to revive old ones. Conley three days ago,

The U.S.

intends to optimizing the use of the nation's existing nuclear plants, we're talking about renovating outdated plants which pose a security risk, about providing more resources and tax incentives so nuclear energy can improve.

And this doesn't cost much money Then, the WNA '23 states that the cost of upkeep for power plants in europe is just 20 million dollars, including renovations.

Now, let's talk about their case:

On their c1 about accidents:

Even with accidents nuclear power is still safe

Paul **Fanto**, 2-7-20**19**, "A Green Nuclear Deal:Why The U.S. Should Expand Nuclear Power", Distilled Periodical, https://yaledistilled.sites.yale.edu/browse-issues/2019-issue/green-nuclear-dealwhy-us-should-expand-nuclear-power

However, all available evidence shows that these standards are met, both in the U.S. and globally. According to data compiled by the earth scientist James Conca in 2012, **the number of deaths per hour of electricity produced globally by nuclear power was 90, including estimates for Chernobyl and Fukushima, compared with 150 for wind power and nearly 4,000 from natural gas** (23). While these numbers rely on epidemiological assumptions, the main point is that **the nuclear reactors currently in operation are relatively very safe. Even in the case of serious accidents, modern reactors are safer than is currently believed.**

Even if there are still concerns about the safety of nuclear power, remember our case, where we tell you that the primary cause of accidents are outdated reactors and other equipments that case power plants to perform worse. Therefore, the only way to prevent a nuclear accident is by affirming, because we then give plants the ability to prevent accidents. Remember, nuclear power won't go down if we negate, so the best option is to find a way to prevent accidents, which only happens with the affirmative.

On their c3 about a trade off

First, I want to point out that investing in nuclear energy doesn't lead to a decrease in renewable energy. Both of these energy sources can work together to fight climate change.
Reddy '24 finds

Nuclear-renewable hybrid energy systems (HESs) are able to harness the benefits of each technology into one sustainable and dependable energy source. This is the best solution to climate change, a combination of the two energy sources. Renewables have been around for 50 years, and while it is important, it's time for a change, one that combines both techniques.

But then, **Renewables don't live up to their expected performance**

Department of Energy 25 [U.S. Department of Energy, "What is Generation Capacity", March 30, 2025, U.S. Department of Energy, https://fortune.com/2022/03/29/us-energy-independence-uranium-nuclear-power/]

Capacity factors allow energy buffs to examine the reliability of various power plants. It basically measures how often a plant is running at maximum power. A plant with a capacity factor of 100% means it's producing power all of the time. 3 times more often than wind (34.3%) and solar (23.4%) plants.

Also, adding nuclear to our arsenal of energies is good, because it can meet needs that renewable sources can't. For example, Solar panels can't generate energy when the sun isn't shining, but plants can.

RBC 24 [RBC, "Nuclear energy sector getting the push it needs", 05/08/2024, Canada Asia Centre-Vancouver, https://ca.rbcwealthmanagement.com/international.vancouver/blog/4188242-Nuclear-energy-sector-getting-the-push-it-needs]

Nuclear plants generate power 93% of the time, whereas intermittent **renewable resources like wind and solar generate power 35% and 25% of the time**,

But now, let's talk about their evidence from the 123 countries

Perez 21 (Daniel Perez, 3/16/2021, Hal Science, https://hal.science/hal-03170325v1/file/On_Sovacool_s_et_al_.pdf, Accessed 4-2-2025, wayway)

Moreover, the reasoning behind the "crowding out" hypothesis is flawed. Indeed, the authors of [16] motivate the proposal of the "crowding out" hypothesis as follows. Intermittent renewables require a decentralized electrical infrastructure as soon as they occupy a significant fraction of the electricity produced. By contrast, the optimal electrical infrastructure of non-intermittent power sources, such as fossil fuels, hydroelectricity and nuclear power is centralized [2]. The authors then suggest that, for these reasons, there should be an

Basically, the only renewable energy form that was crowded out is hydroelectricity. But then, the only reason that why hydroelectricity was decreased is because both hydroelectricity and nuclear power are centralized forms of energy. A power grid can only support one of these, but other forms of renewables, like solar and wind, don't decrease.

On their c2 about cost

Nuclear energy is also comparatively cheaper in the short and long term

WNA, No Publication, 09-29-20**23** // // Economics of Nuclear Power // https://world-nuclear.org/information-library/economic-aspects/economics-of-nuclear-power // accessed 3-28-2025 // ashe

Nuclear power is cost-competitive with other forms of electricity generation, except where there is direct access to low-cost fossil fuels. **Fuel costs for nuclear plants are a minor proportion of total** generating **costs**, though capital costs are greater than those for coal-fired plants and much greater than those for gas-fired plants. System **costs for nuclear** power (as well as coal and gas-fired generation) **are** very **much lower than** for intermittent **renewables**. Providing incentives for long-term, high-capital investment in deregulated markets driven by short-term price signals presents a challenge in securing a diversified and reliable electricity supply system. In assessing the economics of nuclear power, decommissioning and waste disposal costs are fully taken into account.

Looking at the numbers, a nationwide study of potential energy sources from WNA in 2023 concludes

WNA, No Publication, 09-29-20**23** // // Economics of Nuclear Power // https://world-nuclear.org/information-library/economic-aspects/economics-of-nuclear-power // accessed 3-28-2025 // ashe

In 2017 the US EIA published figures for the average levelized costs per unit of output (LCOE) for generating technologies to be brought online in 2022, as modelled for its Annual Energy Outlook. These show: advanced nuclear, 9.9 ¢/kWh; natural gas, 5.7-10.9 ¢/kWh (depending on technology); and coal with 90% carbon sequestration, 12.3 ¢/kWh (rising to 14 ¢/kWh at 30%). Among the non-dispatchable technologies, LCOE estimates vary widely: wind onshore, 5.2 ¢/kWh; solar PV, 6.7 ¢/kWh; offshore wind, 14.6 ¢/kWh; and solar thermal, 18.4 ¢/kWh. The 2020 edition of the OECD study on Projected Costs of Generating Electricity showed that the range for the levelized cost of electricity (LCOE) varied much more for nuclear than coal or CCGT with different discount rates, due to it being capital-intensive (see above). **The nuclear** LCOE [levelized **cost of electricity**] is largely driven by capital costs. At a 3% discount rate, nuclear **was substantially cheaper than the** alternatives in all countries, **at 7%** it was comparable with coal and still cheaper than CCGT, at 10% it was comparable with both. At low discount rates **it was much cheaper than wind and solar** PV. Compared with a 0% discount rate, the LCOE for nuclear was three times as much with a 10% discount rate, while that for coal was 1.4 times **and** for CCGT it **changed very little**. Solar PV increased 2.25 times and onshore wind nearly twice at a 10% discount rate, albeit with very different capacity factors to the 85% for the three base-load options. For all technologies, a $30 per tonne carbon price was included. LCOE figures omit system costs.