

Safeguarding Nuclear Power Infrastructures: Disaster Planning with Potassium Iodide to Save Lives

*By Jake Kohn and Liz Demaree**

As climate threats mount, nuclear power emerges as a potential climate solution, challenging past fears with new technology and urgent environmental pressures. The authors of this article discuss disaster preparedness strategies.

As the world grapples with the escalating threat of climate change, the United States faces a conundrum: how to meet growing energy demands while reducing carbon emissions. In this context, nuclear power has resurfaced as a viable solution. With the Biden administration's nuclear energy push,¹ the recent Three Mile Island proposed reopening announcement,² and the advent of small modular reactors (SMRs)³ promising safer and more efficient energy production, support for new nuclear construction is gaining momentum. However, the intensifying risks associated with global warming, such as more frequent and severe hurricanes and flooding, necessitate a reevaluation of our preparedness strategies.

CURRENT STATE OF PREPAREDNESS

Nuclear power is often lauded for providing large-scale, low-carbon electricity. Existing nuclear plants in the United States generate about 20% of the nation's electricity and over 50% of its low-carbon electricity,⁴ with that number likely to grow in the coming years. Yet, the increasing incidence of extreme weather events linked to climate change poses challenges to nuclear infrastructure. Places like North Carolina, home to three nuclear power plants, are now experiencing severe weather previously uncommon in those areas, highlighting vulnerabilities in nuclear facilities.

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¹ <https://bidenwhitehouse.archives.gov/ostp/news-updates/2024/11/12/biden-%E2%81%A0harris-administration-establishes-bold-u-s-government-targets-for-safely-and-responsibly-expanding-u-s-nuclear-energy-and-announces-framework-for-action-to-achieve-these-targets/>.

² <https://www.washingtonpost.com/business/2024/09/20/microsoft-three-mile-island-nuclear-constellation/>.

³ <https://www.energy.gov/ne/articles/nrc-certifies-first-us-small-modular-reactor-design>.

⁴ <https://world-nuclear.org/information-library/country-profiles/countries-t-z/usa-nuclear-power#:~:text=Given%20that%20nuclear%20plants%20generate,maintain%20a%2020%25%20nuclear%20share.>

The intersection of nuclear power expansion and climate-change induced risks requires robust countermeasures to ensure public safety and infrastructure resilience. State and local officials, alongside private companies, must prioritize comprehensive safety protocols tailored to these evolving threats. A critical aspect of preparedness is the strategic stockpiling of potassium iodide (KI), which protects the thyroid gland from radioactive iodine released during a nuclear incident. KI floods the thyroid with nonradioactive iodine and prevents the uptake of the radioactive molecules. The Nuclear Regulatory Commission (NRC) requires states (including tribal governments) that have populations within the 10-mile emergency planning zone of a commercial nuclear power plant to consider including KI in emergency plans as a protective measure.⁵

However, the expanding footprint of potential hurricane and flooding zones, as well as proposed facilities, calls for a reassessment of that policy, and previous severe weather events highlight why. When Hurricane Katrina slammed into New Orleans in 2005, it took seven days for most people to be successfully evacuated. Today, about half of the U.S. population lives within 50 miles of a nuclear power plant,⁶ indicating that as many as 500 million tablets of KI could be needed in the event of a more a serious power plant accident and at least that many should the United States ever be attacked with a nuclear weapon. Unfortunately, the current U.S. stockpile of KI tablets is only about 1% of the amount that would be needed.

Government entities like the Department of Energy (DOE), Nuclear Emergency Support Team, National Nuclear Security Administration, Department of Defense, and the International Atomic Energy Agency collaborate to enhance global nuclear security. Strengthening public-private partnerships is essential for national security and public safety.

Alan Morris, co-founder and president of Anbex, a leading producer of KI, notes the cost of unpreparedness⁷ is much higher. “While the NRC suggests ‘sheltering’ for those that can’t evacuate during a nuclear event, if thousands or millions must shelter in contaminated areas without KI, the result could lead to significant health issues, all preventable by a pill that costs pennies and lasts for decades,” Morris said. Recent disasters underscore the need for larger conversations to enact progressive policies that prioritize risk mitigation. Congress has taken steps in the pending FY25 appropriations package to address these concerns, focusing on state strategic nuclear stockpiles.

⁵ <https://www.nrc.gov/about-nrc/emerg-preparedness/about-emerg-preparedness/potassium-iodide-use.html>.

⁶ <https://www.eia.gov/energyexplained/nuclear/data-and-statistics.php>.

⁷ <https://www.nrc.gov/about-nrc/emerg-preparedness/in-radiological-emerg.html>.

The Departments of Labor, Health and Human Services, and Education, and Related Agencies Appropriation Act 2025 includes guidance that supports state efforts to secure essential medical resources for public health emergencies. The bill emphasizes the importance of collaboration with the Secure National Stockpile (SNS) while ensuring states have clear instructions on managing their own stockpiles. However, the plan lacks specifics on how states should implement these efforts, what resources or support they will receive, and the accountability mechanisms to ensure compliance. To strengthen the initiative, clearer details on coordination, state assistance, and oversight would help ensure effective and comprehensive disaster preparedness.

PREPARING FOR POTENTIAL INCIDENTS

The balance must be struck between the prioritization of clean, reliable energy with risk mitigation, waste management, and public perception. In addition to advancing nuclear technologies that are safer and more efficient, land use zoning laws must be standardized nationally with the addition of caveats that exclude regions under threat by both potential and existing environmental impacts. The oversight and approval by the NRC of these high-impact facilities at times is impacted by local zoning laws, which vary by municipality. With the transition to a new administration prioritizing energy independence in tandem with “energy dominance,” it is crucial that agencies work to streamline the approval and licensing processes for new nuclear plants and reactor designs, potentially accelerating the construction of nuclear facilities but also ensuring a universal policy shift invoking climate science and public safety.

Empowering states to maintain their own stockpiles will enhance their ability to protect populations and respond to area-specific emergencies. On the regulatory front, the NRC must consider how climate change could affect procedures in the event of nuclear incidents, including stockpiling and distributing KI beyond the current 10-mile radius should major flooding prevent people from evacuating, which happened recently in North Carolina with Hurricane Helene. Collaborating with climate scientists and leveraging advanced modeling tools will enable more informed decision-making.

The Fukushima disaster in 2011 illustrated the catastrophic consequences when nuclear power and natural disasters collide. While the United States has 93 commercial nuclear reactors, unexpected events and the failure of supporting infrastructure can lead to radiological danger. At Fukushima, the reactors survived the earthquake, but the loss of electricity to cooling pumps triggered an emergency, further emphasizing the importance of preparedness.

With about 30 new nuclear power plants proposed across the United States,⁸ the energy yield is projected to significantly increase available supply. However, most proposed plants are located in states facing potential environmental risks, including those that historically have dodged hurricanes and extreme flooding events. It further raises the need for proactive reconsiderations that impact the public health and safety of the communities surrounding these proposed sites.

Investments in resilient infrastructure, such as elevated designs, robust flood barriers, and reinforced cooling systems, are imperative. Additionally, assessing and bolstering KI stockpiles within the Strategic National Stockpile and establishing state SNS with sufficient KI can mitigate health risks. Public education campaigns on KI use and critical access at public facilities can further influence public trust and readiness.

To enhance public health preparedness, a national health policy should be established to ensure that all communities near nuclear facilities have access to comprehensive emergency response plans, including regular distribution of KI, public education on its use, and ongoing training for healthcare providers in managing potential nuclear incidents.

PLANNING FOR THE FUTURE

As clean energy initiatives have increased, the demand for nuclear power has increased. By boosting domestic energy production through public-private partnerships, the United States can reduce its reliance on foreign markets. The Environmental Protection Agency and Centers for Disease Control and Prevention play a critical role overseeing different aspects of health risks to the nation's populations. As federal funding for nuclear power potentially increases in 2025 through research and development, loan guarantees, tax incentives, and waste management programs, the DOE plays a central role in funding nuclear innovation. Safeguards included in grants and other mechanisms that ensure strategic health protocols for both the employees and those living within an increased radius of a nuclear plant, as well as industry-specific insurance programs for residents under the Price-Anderson Act, must be revisited. The level of federal support for nuclear expansion is likely to remain a topic of political debate, especially as the next administration defines its priorities.

Support for nuclear power, especially SMRs, is a positive step toward a more sustainable energy future as the country works to balance energy security, climate goals, and economic considerations. However, the escalating threat of global warming demands a dual focus on energy innovation and climate resilience. State and local officials, along with private companies, must act

⁸ <https://www.energy.gov/ne/articles/us-sets-targets-triple-nuclear-energy-capacity-2050>.

decisively to implement proactive measures, including public access to KI and investments in resilient infrastructures. Empowering communities with access to KI, strengthening emergency response plans, and investing in resilience are key steps for securing a sustainable energy future.

Engaging public officials is also essential for developing effective energy policies that prioritize safety at state and local levels. By advocating for legal frameworks that mandate comprehensive emergency preparedness and risk mitigation, we can effectively protect our communities amid this nuclear energy expansion.

IN SUMMARY

- As the United States seeks to balance growing energy demands with carbon reduction, nuclear power is emerging as a potential solution, with about 30 new nuclear power plants proposed nationwide. However, the increasing risks stemming from climate change, such as more frequent hurricanes and flooding, necessitate robust preparedness strategies.
- Current nuclear infrastructure faces significant challenges, including inadequate KI stockpiles for potential emergencies. The United States currently has only 1% of the KI tablets needed to protect populations near nuclear facilities, with approximately 500 million tablets potentially required in a serious nuclear incident.
- Government agencies are working to enhance nuclear security and preparedness, with recent legislative efforts like the FY25 appropriations package focusing on state strategic nuclear stockpiles. The approach involves strengthening public-private partnerships, investing in resilient infrastructure, and developing comprehensive emergency response plans.
- While nuclear power offers a low-carbon electricity solution, currently generating 20% of U.S. electricity, its expansion must be carefully balanced with public safety considerations, including strategic land use zoning, improved emergency protocols, and proactive risk mitigation strategies.