NSC Action Steps for Nuclear Energy

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Executive Summary

The U.S. nuclear energy sector faces mounting global competition from state-backed strategies by China and Russia, threatening U.S. leadership in nuclear innovation, energy security, and geopolitical influence. To address these challenges, we recommend three key policies that bolster the U.S. nuclear industry's competitiveness and effectiveness. First, establishing a Centralized Nuclear Codes Database (CNCD) will streamline the permitting process for nuclear reactors by consolidating regulatory requirements, cutting permitting timelines, and reducing costs. Second, implementing a Cost Overrun Insurance Program, as proposed in the ARC Act, will mitigate financial risks, accelerate project timelines, and unlock private investment in nuclear projects. Third, forming a Strategic Export Consortium will enable the U.S. government and private sector to collaborate effectively in competing with state-backed rivals, securing new markets, and strengthening international partnerships.

Current U.S. Policy Framework to Advance Nuclear Energy

The United States is advancing its nuclear energy strategy with policies designed to modernize the industry, enhance energy security, and maintain global leadership. The Nuclear Energy Innovation and Modernization Act (NEIMA) of 2019 introduced risk-informed licensing for advanced reactors and improved cost transparency. Reforms under the Permitting Reform Bill (2023) expedited approvals for projects like Small Modular Reactors (SMRs), while the NRC's Part 53 regulations aim to further streamline licensing.

In 2024, initiatives like the ADVANCE Act set an 18-month timeline for advanced reactor licensing, expanded international collaboration, and allocated grants for workforce and supply chain development. The DOE provided $900 million for SMR deployment, launched a $100 million nuclear safety training program, and supported HALEU enrichment while banning Russian uranium imports under the Uranium Import Ban Act. The recently introduced ARC Act seeks to reduce financial risks for private-sector nuclear investments, further positioning nuclear energy as central to U.S. clean energy goals.

Global Competition: China and Russia

China and Russia are dominating global nuclear markets, leveraging state-backed strategies that present significant challenges to U.S. influence. China has 23–27 reactors under construction domestically and exports to Pakistan and Argentina, key non-NATO allies. Its Belt and Road Initiative deepens influence in non-Western markets, supported by advanced designs like the Hualong One and Shidaowan-1 (the first 4th-gen reactor). With construction timelines averaging seven years and financing rates as low as 1.4%, China outpaces Western nations in efficiency and cost. These advancements enable China to expand in geopolitically sensitive regions critical to U.S. interests.

Russia, through Rosatom, controls 50% of global reactor exports with 13 projects under construction internationally and 11 connected between 2000 and 2021. Using its Build-Own-Operate (BOO) model, Russia creates long-term dependencies in nations like Turkey and Egypt, where it also dominates HALEU fuel production needed for SMRs. Comprehensive financing packages and innovations like floating power plants ensure Rosatom's continued leadership.

The U.S., by contrast, has only two reactors under construction domestically and no international projects, accounting for just 10–15% of global nuclear activity. Between 2000 and 2021, the U.S. connected only four reactors internationally, all exported to China. Weak financing mechanisms further limit its competitiveness. Current U.S. nuclear export deals with Poland (3 AP1000s) and Romania (SMRs) are examples of one-off agreements that are time consuming and less attractive than package deals.

China and Russia's expansion into Pakistan, Argentina, Egypt, and Turkey underscores the urgency for the U.S. to strengthen its nuclear exports and financing mechanisms to protect its leadership in global nuclear standards and security.

Expedite: Centralized Nuclear Codes Database

Background

The United States will face significant delays in permitting Small Modular Reactors (SMRs), estimating an average 5-10 years compared to 1-3 years in China. Inefficiency in nuclear energy licensing stems from a fragmented regulatory system involving over 30 steps, 17 organizations, and several data repositories. These delays will hinder SMR deployment, undermine U.S. energy independence, and reduce competitiveness in the global energy market.

The proposed Centralized Nuclear Codes Database (CNCD) addresses these challenges by consolidating federal, state, and local permitting requirements into a unified platform, integrating AI-driven compliance tools, and enabling iterative improvements to permitting processes. By streamlining workflows and reducing redundancy, the CNCD is projected to cut permitting timelines by 15-25% and reduce associated costs by 20-30%, ensuring a return on investment within 1-4 years. Immediate action is required to secure interagency collaboration and funding to modernize the regulatory framework, positioning the U.S. as a leader in advanced nuclear technologies.

Recommendation: Construct a Centralized Database for Nuclear Codes

Objective: Implement a centralized platform to streamline permitting, enhance regulatory consistency, and improve efficiency.

Proposed Features:

- Comprehensive Integration: Consolidates federal codes (e.g., NRC's ADAMS), state regulations, and local permitting requirements into one platform.
- AI-Powered Compliance Tools: Automates cross-referencing, identifies discrepancies, and reduces manual errors.
- Modern Search Capabilities: Enables keyword searches, metadata tagging, and document previews.
- User-Friendly Interface: Inspired by systems like BuildChek AI to ensure usability.

Projected Impact:

- Cost Savings: Reduces permitting costs by 20-30%, saving $6-9 million per project.
- Time Savings: Cuts permitting timelines by 15-25%, accelerating SMR deployment.

Implementation Steps

Step 1: Establish Leadership and Secure Collaboration (0-3 Months)

- Convene an NSC-led task force with NRC, DOE, EPA, FEMA, and state regulators.
- Partner with a technology solutions provider (e.g., AWS, Microsoft, or IBM) to design the database infrastructure.
- Secure funding via federal legislation (e.g., ADVANCE Act), public-private partnerships, or agency budgets.

Step 2: Develop and Deploy the Database (6-12 Months)

- Launch a minimum viable product (MVP) with centralized access to critical permitting data.
- Formalize data-sharing agreements through Memoranda of Understanding (MOUs) with state and local agencies.
- Create an open submission portal to streamline data uploads from relevant stakeholders.

Step 3: Continuous Refinement (Ongoing)

- Establish an improvement team to update codes, address feedback, and enhance functionality.
- Use collected data to identify regulatory bottlenecks and refine processes over time.
- Monitor system performance to ensure alignment with regulatory objectives.

Alternative Recommendation: Encourage Standardization of Reactor Designs

While standardizing reactor designs could simplify the permitting process, it risks stifling innovation. By maintaining flexibility, the CNCD fosters competition and supports technological advancements, ensuring the U.S. retains its leadership in nuclear innovation.

Conclusion

The Centralized Nuclear Codes Database provides a strategic solution to streamline permitting processes without compromising innovation. Unlike standardization, which limits technological diversity, the CNCD balances efficiency with the imperative to foster private-sector advancements. This initiative positions the U.S. to lead in nuclear innovation, bolster energy independence, and achieve climate goals.

De-Risk: Cost Overrun Insurance and the ARC Act

Background

The deployment of advanced nuclear technologies, including Small Modular Reactors (SMRs), is essential to achieving U.S. clean energy goals and sustaining global energy leadership. However, financial barriers, particularly cost overruns during construction, deter private investment, delay projects, and inflate costs. This was last seen in the Vogtle Nuclear Plant expansion in Georgia, which saw its budget rise from $14 billion to over $30 billion and its timeline extended by more than seven years.

To address these issues, the proposed cost overrun insurance program aims to reduce financial risks, boost investor confidence, and accelerate project timelines. This concept was introduced in the Senate through the Accelerating Reliable Capacity (ARC) Act in December 2024. The program is proposed to be financed by unobligated funds from the Infrastructure Investment and Jobs Act (IIJA) and the Inflation Reduction Act (IRA). However, $2.5 billion in IRA funds face an expiration deadline at the end of fiscal year 2026, necessitating urgent legislative action. Securing bipartisan support for the ARC Act is critical to ensuring cost overrun insurance is available to advance U.S. nuclear innovation and energy independence.

Recommendation: Establish Cost Overrun Insurance Through the DOE-LPO

Objective: Implement a cost overrun insurance program to mitigate financial risks, attract private investment, and advance the deployment of advanced nuclear technologies.

Proposed Features:

- Cost Overrun Insurance: Insures 50-70% of cost overruns beyond a predefined baseline budget, capped at 10-20% of the total project cost.
- Premiums: Developers pay 2-3% of the insured amount as annual premiums, ensuring the program's fiscal sustainability.
- Eligibility Requirement: Projects must secure loan guarantees from the DOE-LPO, as outlined in the ARC Act, to qualify for insurance.

Projected Impact:

- Unlocking Investment: Reduces perceived financial risk, unlocking an estimated $100-150 billion in private investment over the next decade.
- Faster Timelines: Projected to shorten project timelines by 2-3 years due to enhanced financial stability and investor confidence.

Implementation Steps

Step 1: Secure Political Support and Pass the ARC Act (0-6 Months)

- Identify and collaborate with a Democratic senator to co-sponsor the ARC Act and expedite its introduction into the Senate by gaining bipartisan support.
- Leverage the time-sensitive nature of Inflation Reduction Act (IRA) funds to prioritize rapid legislative action.

Step 2: Establish a Cost Overrun Insurance Program within the DOE-LPO (6-12 Months)

- Develop a sub-program within the DOE-LPO's Title 17 Clean Energy Financing Program to manage cost overrun insurance.
- Formalize program guidelines in collaboration with private developers and financial institutions, including premium structures and claims processing procedures.
- Integrate the insurance framework into DOE-LPO's existing financing processes, leveraging its robust infrastructure.

Step 3: Launch a Pilot Program

- Identify 3-5 advanced nuclear projects as pilot candidates based on readiness and financial need.
- Use data from the pilot program to refine processes, adjust coverage limits, and validate the program's effectiveness.
- Publicize early successes to build further investor confidence and support for scaling the program.

Conclusion

The integration of cost overrun insurance into the DOE-LPO's Title 17 Clean Energy Financing Program provides a strategic and practical pathway to revitalize U.S. nuclear innovation. The ARC Act serves as a critical legislative vehicle to formalize this program, but swift action is essential to secure the necessary funding. With a narrow window to capitalize on available resources, Congress must act immediately to safeguard the nation's clean energy future and solidify its leadership in the global energy market.

Export: Countering Economic Statecraft with Private Consortium

Background

The global nuclear energy market is increasingly dominated by state-supported entities from Russia and China, which leverage package deals that include financing, construction, and operational guarantees. These deals pose a strategic threat to the U.S.'s ability to influence international nuclear norms and diminish opportunities for U.S. companies in the nuclear export market. The U.S. must establish a coordinated, government-backed strategic export team that enables private sector collaboration.

Recommendation: Create a Strategic U.S. Government Backed Export Team

Objective: To lay the groundwork for reliable, scalable nuclear energy exports while fostering long-term international partnerships through streamlined government and private sector collaboration.

Proposed Features:

- Enhanced Global Competitiveness: Establish a framework that allows U.S. companies to compete effectively with state-backed rivals by offering reliable and scalable nuclear energy export solutions.
- Streamlined Collaboration: Create mechanisms for seamless communication and coordination between government agencies and private companies to ensure alignment and efficiency.
- Risk Mitigation and Financing: Leverage U.S. government tools to reduce financial risks and provide competitive export packages for international partners.
- Trust and Reliability: Build long-term relationships with international partners by consistently delivering reliable and innovative nuclear energy solutions.

Projected Impact:

- Reliable and Scalable Infrastructure: Establish a framework for dependable nuclear energy exports, enabling U.S. companies to meet global demand effectively.
- Long-term Partnerships: Strengthen international relationships through trust, reliability, and consistent collaboration.

Implementation Steps

Step 1: Establish a Director Role for International Nuclear Energy Policy within the NSC and Create Interagency Taskforce (0-6 Months)

- Appoint a senior official to lead the strategy and coordinate efforts across relevant agencies.
- Form an interagency task force to align policies, streamline decision-making, and identify key markets for engagement.

Step 2: Define Consortium Structure and Operating Model (6-12 Months)

- Convene U.S. nuclear energy companies to establish a consortium governance structure.
- Develop operating guidelines, including mechanisms for joint ventures, resource sharing, and client engagement.
- Align consortium activities with U.S. government financing and export policies.

Step 3: Facilitate International Agreements and Codify Consortium Through Legislation

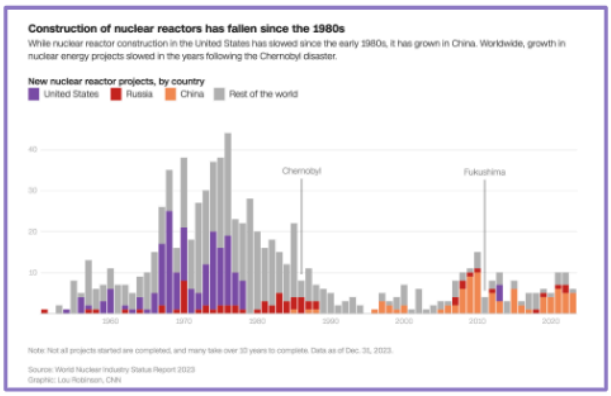
- Engage ally and partner nations to develop bilateral and multilateral agreements supporting U.S. nuclear exports.
- Codify the consortium and task force's roles and responsibilities through legislation to ensure long-term sustainability.
- Integrate the consortium's efforts with international initiatives, such as the International Atomic Energy Agency's programs.

Conclusion

A government-backed consortium provides the foundation for reliable and scalable nuclear energy exports, fostering long-term international partnerships. By streamlining communication across companies and agencies, scaling the model for future deals, and ensuring alignment in financing and technical standards, the U.S. can solidify its leadership in the global nuclear energy market, strengthen geopolitical influence, and promote economic growth.

Appendix

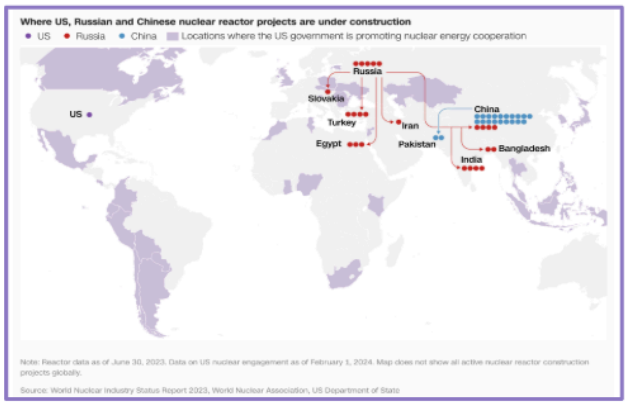
A look into the Global Competition Landscape



By 2030, China's nuclear capacity will surpass the U.S.

Russia and China dominate energy exports, securing century-long alliances.

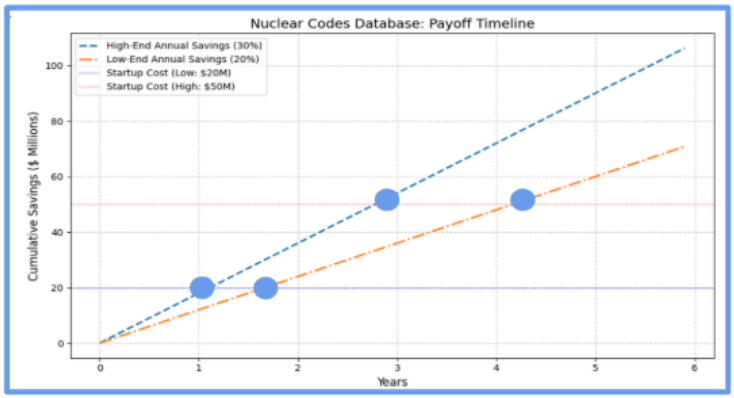
"China is leading in nuclear technology and construction, and Russia is making almost all the world's SMR fuel. The US is playing catch-up on both."



Expedite: Cost and Savings of a Centralized Database

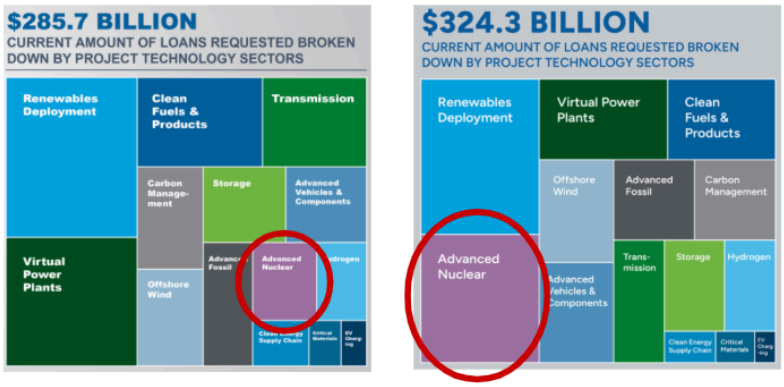
1. **Database Startup Cost Projection**: Estimated at **$20–50 million**.
2. **Incremental Savings Projection:**

- Average permitting cost for an SMR project: **$30 million** (conservative estimate).
- Savings per project from the database:
  - 20% cost reduction = **$6 million per project**. (Payoff in ~2-4 years)
  - 30% cost reduction = **$9 million per project**. (Payoff in ~1-3 years)



IMPACT:
$6-9 million cost savings per project

De-Risk: The DOE's LPO is the Way to Go



LPO requested loans by technology from June to November of 2024

Export: Departments Involved

Proposed policy could be codified by similar legislation to the proposed **International Nuclear Energy Act** (INEA). Upcoming **DFC** and **ExIm** reauthorization legislation also present opportunities to add nuclear energy specific mandates.

- Department of State
- Department of Commerce
- Department of the Treasury
- Department of Energy
- Nuclear Regulatory Commision
- Export Import Bank of the U.S.
- U.S. International Development Finance Corporation
- U.S. Trade and Development Agency