

From Fragmentation to Action

THE CORE CHALLENGE:

Fragmentation Across the Innovation Pipeline

DOE's organizational structure reflects its historical evolution rather than the demands of modern energy innovation. The Department operates as a collection of programs and program offices focused on discrete missions with separate appropriations and constituencies. This architecture creates few incentives for the cross-functional collaboration across DOE offices essential for moving technologies through the full innovation pipeline from basic research to commercial deployment.

One damaging consequence of this fragmentation is the first “valley of death” that opens between early-stage research and larger-scale pilot and demonstration projects. Technologies that show promise at the proof-of-concept stage frequently stall before reaching prototype and demonstration not because of technical flaws, but because no single entity within DOE takes responsibility for managing the handoff between offices or programs. The second “valley of death” in between pilot-scale and commercialization was just beginning to be addressed with the creation of OCED, but certain OCED-funded technologies lacked a pipeline of prototype and pilot projects ready for scale-up.

This systemic problem ensures that only the most resilient—or politically favored—technologies survive the journey from lab to market. Meanwhile, innovations that could transform entire sectors languish for want of institutional coordination and long-term planning. For example, several long-duration energy storage technologies have languished without adequate funding and without a designated DOE program to support their scale-up.



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THE OPPORTUNITIES:

Empowering the Department to Unleash Energy Innovation

High-level recommendations for how to reform DOE to better enable a modern energy innovation ecosystem in the United States include:



Building a Unified Innovation Framework

Establishing a unified and enduring innovation framework requires structural reforms to DOE operations and realigned incentives. The goal is a seamless, durable pipeline from research to deployment, with clearly aligned funding, governance, and collaboration incentives. It must be a system built for continuity and designed to empower fast, mission-driven action regardless of the administration. This framework should include redefining success around shared outcomes across DOE programs and establishing specific milestones for priority technologies as they move along the commercialization pipeline.



Enabling Cross-Program Planning and Funding

Beyond management changes, DOE needs new financial mechanisms that enable sustained collaboration across organizational boundaries. The rigid “color of money” rules that prevent pooling funds between different appropriations, combined with annual budget cycles, make long-term joint planning exceptionally difficult. Where possible, Congress should provide multi-year appropriations for demonstration projects and other initiatives that span the traditional annual cycle, as it did in IIJA. This authority would enable DOE to make reliable funding commitments to partners and reduce the pressure to obligate funds hastily at fiscal year-end.



Enhancing Program Agility and Responsiveness

Rigid solicitation structures and lengthy review cycles can cause DOE to miss opportunities or fund yesterday’s priorities instead of tomorrow’s breakthroughs. Traditional federal procurement processes, designed for predictable purchases of established technologies, often prove inadequate for the dynamic world of energy innovation. DOE should expand its use of alternative funding tools, including but not limited to other transaction authorities, milestone-based payments, prizes, and demand-side support, and experiment with rolling and annual competitions that would allow for better alignment with applicant timing.



Strengthening Industry Partnerships for Market-Driven Innovation

In addition to unblocking the innovation pipeline for new technologies, DOE and the national laboratories have important roles to play in ensuring that technologies that have already been deployed continue to improve. Partnerships with industry should strengthen the private sector's capacity to lower costs, add functionality, and respond to market demands. DOE should systematically expand programs that make laboratory resources available to private-sector innovators facing specific technical challenges. This includes expanding technology prototype test facilities, voucher programs for companies to access lab resources, and entrepreneurial programs designed to incubate new technologies and ideas.¹



Building for Institutional Continuity

Perhaps the greatest challenge facing federal energy innovation programs is the whiplash that accompanies changes in political leadership, creating uncertainty that undermines long-term investment and partnership between the federal government and industry. While no institutional design can fully insulate programs from political change, certain features can enhance durability. Multi-year budget authority reduces vulnerability to annual appropriations politics; although, as recent cuts show, even the most thoughtful approach to budget authority cannot fully protect programs from a hostile political environment. Strong partnerships with states, universities, and industry create external constituencies that advocate for program continuation. Programs should prioritize strong partnerships with states, universities, and industry to ensure program continuation and demonstrate clear value through measurable outcomes, showing that they consistently produce results that benefit constituencies across political lines.

Transforming DOE from a collection of competing programs into a unified innovation system will require sustained effort from leadership, staff, and external partners. The changes outlined here represent a pragmatic starting point rather than a comprehensive blueprint. Some can be implemented through administrative action, while others will require congressional cooperation.

The ultimate goal is an institution built for continuity—one that serves as a reliable partner to American innovators and a trusted engine for the nation's energy security and economic future. Achieving this vision will require not just new funding, but new ways of thinking about federal agencies and policy implementation.

¹ U.S. Department of Energy (DOE), "Lab-Embedded Entrepreneurship Program," accessed September 17, 2025. <https://www.energy.gov/eere/ammtto/lab-embedded-entrepreneurship-program>



Conclusion

Now is the time to rebuild American energy innovation leadership and forge a cleaner, more affordable, and more secure energy future. The convergence of rising energy costs, geopolitical instability, and climate urgency creates both necessity and opportunity for decisive action.

America's energy challenges demand American solutions. Skyrocketing electricity demand from artificial intelligence and manufacturing reshoring threatens grid reliability and affordability. Our dependence on Chinese-dominated supply chains exposes critical vulnerabilities, from rare earth minerals to battery components. Meanwhile, global emissions continue rising, demanding breakthrough technologies that only sustained innovation can deliver.

The foundation for American leadership remains strong. Our national laboratories, universities, and entrepreneurial ecosystem possess unmatched capabilities in foundational sciences, advanced materials, and complex systems integration. Despite setbacks, recent legislative victories proved bipartisan energy innovation policy remains achievable when focused on shared economic and security interests.

However, foundation without construction yields nothing. China spends twice as much as the United States on energy innovation as a share of GDP, cementing advantages in technologies that will power the next century. The boom-bust cycles that have plagued American energy policy must end, and we must reinvigorate sustained investment and federal support to develop and build the energy technologies of the future.