# Thriving Economy Project



A MENU OF POLICY IDEAS FOR ECONOMIC AND ENVIRONMENTAL PROSPERITY

SEEC Institute
Sustainable Energy & Environment Coalition

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INTRODUCTORY NOTE FROM THE THRIVING ECONOMY PROJECT CHAIR:

# Economic prosperity and environmental stewardship go hand in hand

**WE LIVE IN A RAPIDLY CHANGING WORLD SHAPED BY TECHNOLOGICAL INNOVATION, AN EVOLVING ENERGY LANDSCAPE, AND A HEATING CLIMATE THAT DRIVES UP COSTS FOR COMMUNITIES ACROSS AMERICA.** Yet our ability to tackle these challenges is constrained by political dysfunction and misaligned incentives.

My neighbors across the Sunshine State live this reality every day. They rebuild after devastating hurricanes, endure record-breaking heat, pay more at the grocery store, and face rising electricity bills. They know that climate change isn't just about the weather – it's about their wallets.

And they are not alone. No community in America is untouched by rising costs and growing risks. We need a new approach to lower energy costs, modernize our aging electric grid, and protect our farms, homes, and businesses.

In 2025, SEEC Institute launched the Thriving Economy Project to meet this moment – with a can-do spirit and understanding that Americans deserve both strong economic policy where everyone thrives *and* practical climate policy that builds long-term resilience.

Congress has demonstrated the ability to create meaningful change when we work together. Landmark legislation like the *Infrastructure Investment and Jobs Act*, *CHIPS and Science Act*, and the *21st Century ROAD to Housing Act* were hammered out on a bipartisan basis.

Smart policy can have real impact. For example, the United States deployed 30 times more energy storage in 2025 than in 2020. This makes our grid more reliable, keeps communities safe, and lowers costs. These are American-made solutions, and by 2030, we expect over 950 clean energy manufacturing facilities will support 374,000 jobs.

The Thriving Economy Project reflects this new world. Artificial intelligence has emerged as a powerful tool to reshape our lives – from the automation of manufacturing processes to the discovery of new scientific materials. It's also driving demand for electricity and water and reshaping rural communities. Geopolitical uncertainty, including another conflict in the Middle East, has exposed an economy that is overly dependent on volatile fuel prices and international supply chains.

A thriving economy is a sustainable economy. One where economic prosperity and environmental stewardship go hand in hand. Our project provides a menu of solutions to create jobs, lower energy costs, spur American ingenuity and entrepreneurship, and build stronger, more resilient communities. It's informed by over a thousand policy recommendations submitted by experts, local leaders, companies and advocates. These ideas represent the best of the United States – a vision of a clean and prosperous future where *everyone* benefits. The Thriving Economy Project is our commitment to make this vision inevitable.

Kathy Castor
Congresswoman, Florida's 14th Congressional District
Chair, SEEC Institute Thriving Economy Project

INTRODUCTORY NOTE FROM SEEC INSTITUTE'S EXECUTIVE DIRECTOR:

# Why SEEC Institute? The gap we seek to fill

**SEEC INSTITUTE WAS FOUNDED TO STRENGTHEN CONGRESS BY FILLING THE GAPS THAT PREVENT GOOD IDEAS FROM BECOMING GOOD POLICY.** Sometimes those gaps are practical. Members of Congress and their staff need opportunities to engage with experts, visit communities, see new technologies firsthand, or convene stakeholders who would not otherwise be in the same room. Those are the kinds of gaps SEEC Institute fills every day.

Occasionally, however, a larger gap emerges.

When the House Select Committee on the Climate Crisis concluded its work in early 2023, Congress lost something important. Beyond the hundreds of recommendations it produced and the people it engaged, the Select Committee created space for lawmakers to think comprehensively about the relationship between environmental stewardship and economic prosperity. It provided a venue to ask long-term questions that rarely fit neatly within the jurisdiction of a single committee or the pace of day-to-day legislating.

At our inaugural SEEC Institute Solutions Summit in 2024, Representative Kathy Castor challenged us to consider whether SEEC Institute could help carry that work forward. It was an exciting idea. It was also, at first, a somewhat preposterous one. The Select Committee had the resources of Congress. We were a young nonprofit with two full-time employees.

Fortunately, recreating the Select Committee was never actually the goal. Instead, we asked ourselves a different question: if SEEC Institute were going to contribute something meaningful, what could we do that Congress itself could not?

The answer was not just to write a report. It was to develop a vision.

From the beginning, we believed the Thriving Economy Project would be credible only if it were built *with* Congress, not simply presented to Congress. It needed to reflect the expertise of practitioners as much as academics, the experience of implementers as much as advocates, and the perspectives of industries, communities, and organizations working every day to navigate the opportunities and challenges of a changing economy.

That conviction shaped everything that followed.

Each chapter of the Thriving Economy Project was developed through a partnership between a sitting member of Congress and a skilled policy expert. We convened working groups, roundtables, listening sessions, and private discussions across the country. We issued a public Request for Information that generated more than 1,300 policy recommendations from 150 businesses, trade associations, universities, nonprofit organizations, local governments, researchers, and individuals. We assembled an ideologically diverse 20-member Steering Committee to challenge our assumptions and strengthen our work throughout this process.

**THE RESULT IS NOT A CONSENSUS DOCUMENT, NOR WAS IT EVER INTENDED TO BE. IT IS A MENU OF IDEAS THAT HAVE BEEN CHALLENGED, REFINED, AND IMPROVED BY PEOPLE APPROACHING THE SAME PROBLEMS FROM VERY DIFFERENT PERSPECTIVES.**

The Thriving Economy Project begins from a premise that is both simple and increasingly urgent: the economy and the environment were never separate conversations. The stability of our food system, the reliability of our energy infrastructure, the competitiveness of our domestic industries, the resilience of our communities, the affordability of everyday life, and the health of the natural systems on which they all depend are deeply interconnected.

The country needs a policymaking framework reflecting that reality. Energy demand, global competition, aging infrastructure, the pressures on American families, and a changing climate are not waiting for the perfect political moment. We must build a stronger, more sustainable economy whenever and wherever progress is possible.

That belief explains both the substance and the structure of this report.

The Thriving Economy Project is intentionally organized around outcomes rather than ideology. We begin with goals that most Americans share: affordable and abundant energy, thriving communities regardless of zip code, healthier ecosystems, American leadership in innovation, modern infrastructure, productive agriculture, and broad-based economic opportunity. From there, we offer policy options that can help move us toward those outcomes.

We are presenting options, not prescriptions: the project was never intended to become a single legislative package. Some readers will embrace one recommendation while rejecting another. Members of Congress may find ideas outside the committees on which they serve. Future Congresses will undoubtedly improve upon many of the proposals presented here. We hope they do.

The measure of this project's success will not only be how many of these recommendations ultimately become law. It will also be whether more good ideas enter the policymaking process, whether more people find common ground around shared outcomes, and whether Congress is better equipped to meet the challenges of both today and tomorrow.

This report represents SEEC Institute's first major forward-looking policy development effort. More importantly, it demonstrates what becomes possible when lawmakers, experts, practitioners, businesses, advocates, and communities are given the space to think together about the country's future.

We hope it sparks as many creative ideas, conversations, opportunities, and outcomes for our readers as it did for those of us fortunate enough to collaborate in developing this report.

Max Frankel

Executive Director, SEEC Institute

INTRODUCTORY NOTE FROM THE THRIVING ECONOMY PROJECT LEAD:

# What this report seeks to accomplish

**OVER THE PAST 21 MONTHS, THE THRIVING ECONOMY PROJECT HAS EVOLVED IN WAYS WE COULD NOT HAVE ORIGINALLY ANTICIPATED, GROWING DRAMATICALLY IN SCOPE, SIZE, AND COMPLEXITY.** What began as a more or less straightforward call to action from Representative Kathy Castor in December 2024 expanded into a comprehensive effort to rethink how federal policy can meet the unique challenges of our current moment and moving forward.

Informed by over a thousand meetings, dozens of convenings around the country, more than 150 responses to a Request for Information, and decades of policymaking experience across those directly involved, at its core, this work is about making government a better partner. Simply put, doing so unlocks economic growth, reduces pollution, and empowers thriving communities.

Throughout all the twists and turns in this process, our guiding question – our north star – has remained the same:

**UNDERSTANDING THAT A HEALTHY ECONOMY AND A HEALTHY ENVIRONMENT GO HAND IN HAND, WHAT ARE THE POLICIES NECESSARY TO SUPPORT LONG-TERM, SUSTAINABLE ECONOMIC GROWTH?**

We recognize that for the American people to innovate and invest across all areas of the country, it requires a government that acts as a trusted partner and an honest broker. By providing stable policies and reducing the impact of wild political swings, we can create an atmosphere where the private sector is empowered to step in and solve problems, rather than relying solely on federal intervention.

That is why this blueprint is built upon several foundational principles:

- **TRUST AND STABILITY:** We acknowledge that trust in the federal government is currently at a historic low. Rebuilding that trust will take time, but it begins with making government less opaque and cumbersome, transforming it into a reliable partner, and ultimately benefitting the American people.
- **EQUITY AS A FOUNDATION:** Equity is not just a chapter in this report; it underpins every recommendation we make. Our goal is to ensure the economy truly works for all Americans, regardless of where they live, the color of their skin, their economic status, or who they voted for.
- **INTERCONNECTED SOLUTIONS:** The chapters of this report are intertwined and overlapping, combining targeted policy changes with broader efforts to build the capacity of states, localities, Tribes, and territories. Further, each chapter purposefully includes ideas related to both financing and workforce development solutions to ensure they are actionable investments in our future.

We have not shied away from controversial or unsettled topics. Instead, we have sought to provide a strategic, policy-forward document that reflects a broad diversity of perspectives, offering solutions that can help inform debates and achieve positive outcomes in the public square. Our changing climate and deteriorating environment have shown that returning to the status quo or simply reinstituting past programs is not a viable option. Rather, we aim to identify the gaps that exist today and offer solutions that are down payments on a future economy that works for everyone. We do not presume to have answered every question or have the only answer to the questions we do attempt to answer. Instead, we believe these policy options offer a substantial, practical first step toward a more resilient and collaborative nation.

To be clear, some issues, like permitting reform, are under active debate as we write this report. As such, we do not attempt to tackle this sort of issue head on but rather seek to identify areas where this report's perspective adds nuance and novelty. Other issues may require further attention and creative approaches. Congress often tries to address many of these issues through targeted changes in the tax code. Similarly, increased federal funding across the board is both unlikely to pass into law in the current moment and will not solve all the problems our economy is facing. While we have called for many tax-focused policy options and targeted areas of increased federal investment, they cannot be the only answers. Instead, we tried to identify the areas where we thought a targeted approach might be more successful.

I am grateful to the members of Congress, Steering Committee members, and our policy experts and chapter authors that joined me on this journey. Specifically, I want to thank Callie Eideberg, MacKenzie Bills, Samantha Medlock, Rebecca Jablonski-Diehl, Fatima Ahmad, Evan Chapman, Julia Greensfelder, Satyam Khanna, Tim Profeta, Pearson Croney-Clark, and Katie Greenberg, who shared far more of their time, knowledge, and energy than asked of them, for which this report and the ideas contained herein are the biggest beneficiaries.

With that, we are proud to present this report not as a final word, but as a blueprint: a positive, forward-looking menu of policy ideas designed for immediate consideration to foster long-term, sustainable economic growth along with a healthy environment. We invite you to explore this menu of ideas and join us in the vital work of building a thriving, prosperous, and affordable future.

Eric Fins
Thriving Economy Project Lead
Vice President, Grove Climate Group

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**COMPRISED OF A DIVERSE COALITION OF FORMER AND CURRENT PUBLIC OFFICIALS, PRIVATE-SECTOR LEADERS, ADVOCATES, AND NATIONALLY RESPECTED ENERGY AND ENVIRONMENTAL POLICY EXPERTS, THE THRIVING ECONOMY PROJECT'S STEERING COMMITTEE HELPED SHAPE THIS PRACTICAL AND AMBITIOUS SET OF RECOMMENDATIONS BY BRINGING THEIR DEEP EXPERTISE AND A BROAD SET OF PERSPECTIVES TO THIS PROCESS.**

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# How to Use This Report: A Policy Blueprint Ready for 2027

**AMERICA DOES NOT HAVE TO CHOOSE BETWEEN ECONOMIC PROSPERITY AND ENVIRONMENTAL STEWARDSHIP.** In fact, the two have become increasingly inseparable. The policies that strengthen our economy, reduce costs for families, increase energy security, and improve resilience are often the very same policies that cut pollution and protect the natural systems upon which long-term prosperity depends.

The Thriving Economy Project is designed to identify policies that can enable the realization of an economy that works for everyone while respecting and protecting the environment. A healthy economy and a healthy environment go hand in hand, and the report includes a mix of big ideas alongside practical, immediate options that will meet the moment with the urgency these interrelated problems demand. This work is all about developing a roadmap for action that can help the largest number of people in the shortest possible amount of time.

This report is intentionally structured as a menu of options rather than a singular package. Readers are invited to "order what you want" by selecting the specific policies that best meet their objectives.

## Navigating the Chapters

Each chapter is organized to move from a high-level vision to actionable steps:

- **BENCHMARKS:** These represent the ultimate outcome we want to see and provide a positive vision of how the economy should function.
- **CHALLENGES:** Within each benchmark, we have identified specific gaps or hurdles currently inhibiting those goals.
- **POLICY OPTIONS**: We offer a specific idea or set of ideas to address each challenge.
- **POLICY CONTEXT:** This section provides a deeper explanation and the necessary background for the proposed policy options.

Each chapter is also cross-cutting, and we have referenced the places where topics, issues, or solutions occur across the report.

## Flexibility and Impact

- **PICK AND CHOOSE:** This menu is designed to be picked apart, not as a comprehensive policy package.
- **INDEPENDENT IMPACT:** Every policy option is drafted to stand on its own and have a meaningful impact on policy independently.
- **MULTIPLIER EFFECT:** While these policy ideas stand alone, adopting many policies in concert with one another will result in a more significant cumulative impact.
- **VARIED APPROACHES:** Many issues will be discussed across chapters but from different perspectives. As a menu of options, the report is not always internally consistent, and some proposed policies may not pair well together.

## Assumptions and Baselines

- **HONEST DEBATE AND POLITICS:** There remain significant points of honest debate between well-intentioned people and ideas. In many cases, these debates raise uncomfortable political issues. We recognize these differences and do not present our policy recommendations with the assumption that these debates are settled.
- **GOVERNMENT OPERATING IN GOOD FAITH:** We operate on the baseline belief that government should function in good faith. This includes providing full funding and staffing, as well as living up to all contractual and statutory obligations. The report starts from the beliefs that executive agencies should operate within the spirit of their mandate and that all officers of government follow the law and the Constitution. The federal government must not intentionally violate existing laws.
- **EXISTING PROGRAMS:** There are many important existing programs that should be maintained and could achieve even more impact with increased funding. This policy blueprint will not list all of them. Instead, this blueprint adds to the current policy conversation primarily by highlighting new ideas and elevating areas of consensus for immediate action to resolve U.S. economic challenges.

## Authorship and Scope

- **A PRODUCT OF SEEC INSTITUTE:** The involvement of members of Congress and our Steering Committee was invaluable. As noted throughout the report, members of Congress helped lead and shape individual chapters, and our Steering Committee lent their expertise across the report. However, **THIS REPORT IS A PRODUCT OF SEEC INSTITUTE AND DOES NOT NECESSARILY REPRESENT THE INDIVIDUAL BELIEFS OF THOSE INVOLVED.** That the members of Congress, policy experts, and Steering Committee members were open to, and enthusiastic about, including policy options that they might not themselves support or agree with is a testament to our collaborators' embrace of the vision of this blueprint and their intellectual honesty and rigor.
- **INTENTIONAL SELECTIVITY:** This report is not intended to be exhaustive. While looking comprehensively across sectors of the economy, we have intentionally focused on specific options rather than including every possible policy.

# Flourishing Lands, Communities, and Resources






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CHAPTER 1:

# 21st Century Agricultural Opportunities



## Farmers produce the food we serve our families, and a strong domestic food supply is essential to national and economic security.

Imagine an America where every farmer enjoys a profitable business, not because of annual bailouts, but because policy has been modernized to match economic reality. Where farmers diversify their income across crops, energy, and ecosystem services. Where young producers can access land, credit, and the technical know-how to build lasting operations. Where soil health is the foundation of resilience, not an afterthought. And where research and innovation keep American agriculture at the leading edge of a competitive global market. That is the future this chapter seeks to achieve.

A profitable farming business is achievable, but it requires systems thinking, strategic investment, and bold vision. It requires a different view of how farmers make money and where their revenue comes from, ensuring that soils are healthy, safety nets reward long-term resilience, and federal programs are practical tools that farmers can actually use. It requires significant investment in research and development (R&D) so that American farmers are prepared for any challenge thrown their way and can compete on the world stage for generations to come.

**TO CREATE A THRIVING ECONOMY, THIS CHAPTER FOCUSES ON ACHIEVING THE FOLLOWING BENCHMARKS TO SUPPORT 21ST CENTURY AGRICULTURAL OPPORTUNITIES:**

- **BENCHMARK #1.1:** Farmers have stable, diversified income streams and no longer rely on single crop revenue and federal government bailouts. | 12
- **BENCHMARK #1.2:** Federal programs give farmers easy access to high-quality conservation, technical, and financial support, while markets and partnerships provide long-term income stability. | 15
- **BENCHMARK #1.3:** Federal policy choices and investments expand access to land ownership, reduce financial barriers to entry, and create the financial and market infrastructure that allows young and beginning farmers to own, operate, and build equity in the land they work. | 18
- **BENCHMARK #1.4:** Public and private research drives innovation, equipping farmers and ranchers to anticipate and adapt to future challenges. | 21
- **BENCHMARK #1.5:** Nationwide, farmers grow crops in healthy, biologically active, and nutrient-rich soils, reducing their reliance on costly chemical inputs and increasing their economic sustainability. | 25
- **BENCHMARK #1.6:** Federal crop insurance accurately measures risk, appropriately prices that risk for the market, and incentivizes de-risking practices. | 28

# Rep. Nikki Budzinski

## IL–13



**I GREW UP UNDERSTANDING THAT FARMING IS NOT JUST AN OCCUPATION – IT IS A WAY OF LIFE, A SET OF VALUES, AND A PROMISE MADE ACROSS GENERATIONS.** The farmers in my district in central and southern Illinois didn't choose this work because it was easy. They chose it because they were raised in it, shaped by parents and grandparents who worked the same land, and because they are proud to carry that tradition forward. They chose it because there is something profound and irreplaceable about growing food from the ground up, feeding your neighbors, your country, and the world.

That pride is real. And right now, it is being tested.

America's farmers are producing more than ever, yet too many cannot afford to stay in business. Net farm income has swung wildly in recent years, heavily propped up by federal disaster payments rather than market returns. In 2025, direct government payments surged by more than 350% from the prior year – not because markets improved, but because farms needed to be bailed out. Cash receipts from commodity sales declined for the third year in a row. Farm debt is projected to reach $625 billion in 2026. These are not the numbers of a thriving agricultural economy. They are warning signs.

Illinois sits at the heart of this challenge. We are one of the most productive agricultural states in the nation, a leader in corn, soybeans, and pork production. But Illinois farmers are facing the same impossible math as farmers everywhere: input costs at historic highs, crop prices at the bottom, land values that lock out the next generation, and a federal policy framework built for a world that no longer exists.

That last point matters most to me. The federal farm policies we rely on were not designed for the climate we now face, the markets our farmers compete in, or the food choices Americans make today. A growing national conversation about food quality and where our food comes from has put these questions front and center – and yet federal farm policy continues to incentivize a narrow set of commodity crops rather than the fruits, vegetables, and nutrient-dense foods Americans increasingly want. We should be building farm policy that serves the full range of what Americans can grow and what Americans want to eat.

That's why I am proud to partner with SEEC Institute on this 21st Century Agricultural Opportunities chapter of the Thriving Economy Project. The challenges facing American agriculture do not belong to one party, and neither do the solutions. What I hear from farmers in my district, and from farmers across the country, is a simple ask: treat us like the businesspeople we are. Give us the tools, the research, the markets, and the safety net to build something that will last – not just this season, but for the next generation, and the one after that.

That is what the American people want: a food system that is resilient, affordable, and domestically produced. That is what farmers want: a fair shot at profitability without a Washington bailout every time prices drop or a drought hits. And that is what Illinois needs: federal policies that reward long-term stewardship of the land, open new markets for diversified crops, and ensure that the young farmer who wants to begin a career in farming or take over a family operation can actually afford to do so.

Farmers think in generations. It is time federal policy did the same.

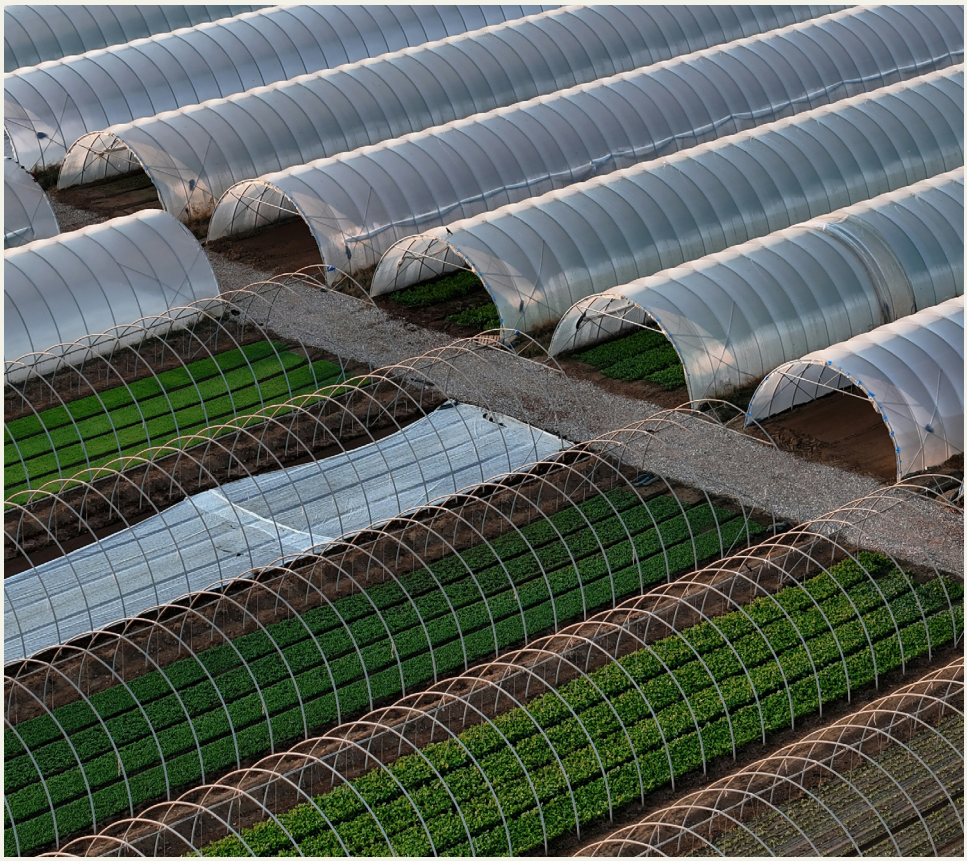
Nikki Budzinski

BENCHMARK #1.1:

# Farmers have stable, diversified income streams and no longer rely on single crop revenue and federal government bailouts.

**DECADES-OLD FARM POLICY HAS NOT KEPT UP WITH THE MODERN REALITY OF FARM ECONOMICS.** Instead, it has locked farmers into a narrow range of crops with very few options for diversification, including the type of crop, the method of production, or the markets they can access. Conventional farming practices limit producers to a small set of crop options, a limited marketplace of buyers, and margins that are often razor-thin or negative. To provide a proper financial return that adequately compensates American farmers, federal agriculture policy must focus on markets, crops, and infrastructure. This section provides policy options for two key challenges:

1. Narrow crop and market options that constrain farm income
2. Weather instability and market volatility that increase on-farm risk



**Challenge – Narrow crop and market options that constrain farm income:** Conventional farming practices limit producers to a narrow set of crop options, a limited marketplace of buyers, and low to negative margins. Farmers deserve the financial return that reflects the essential role they play in feeding the nation and the world.

## Policy Options:

### MARKETS

- Expand organic product market opportunities, focusing on higher-value crops where domestic demand outpaces supply, especially in livestock, creating premium opportunities for U.S. producers. To accomplish this, the public sector should coordinate or invest in supply chain gaps by funding and supporting increased processing capacity, market development activities, and targeted equipment purchases.
- Increase investment in export markets by expanding the number of international buyers for U.S. commodities through boosted federal export programs, paired with enforcement of standards that ensure fair competition on labor and environmental protections.
- Expand biofuel and clean fuel markets to increase farm income, reduce carbon emissions, strengthen domestic energy security, and grow rural manufacturing capacity. Ensure that biofuels policy is paired with safeguards that limit further expansion of the cropland footprint into unplowed grasslands.
- Develop next-generation bioprocessing by supporting partnerships between universities and the private sector that use corn, soy, intermediate oilseeds, crop residue, and biomass feedstocks for consumer and energy products. This is additive to, not a replacement for, new crop diversification.
- Expand domestic market access by reinvesting in programs like farm-to-school, farmers' markets, and local food purchasing initiatives that build diversified buyer networks and generate demand for specialty crops, meat, dairy, and fish.
- Create new sustainability-driven markets by establishing federal procurement set-asides within the U.S. Department of Agriculture's (USDA) Section 32 purchase authority, USDA Foods in Schools, and the U.S. Department of Defense (DOD) Fresh Fruit and Vegetable program for crops grown with regenerative or sustainable practices. Remove regulatory burdens that treat sustainability and climate-focused feed additives as medicine and instead redesign regulatory pathways for feed as either an additive or as an entirely new category.
- Support ecosystem service markets by incentivizing soil carbon sequestration, methane reduction, nitrogen fixing, and other environmental outcomes with strong, reliable financial returns for producers and appropriate controls for durability.
- Promote wildlife-based revenue streams by expanding opportunities for wildlife tourism and ecological services on working lands.

### CROPS

- De-risk adoption of alternative, organic, and emerging crops by providing financial and technical support to help farmers transition to regionally appropriate, higher-value, or climate-resilient crops.
- Establish regional Centers of Excellence that integrate agronomy, business, and policy expertise to identify viable crop opportunities and support farmers through demonstration projects and applied research.
- Encourage diversified production systems by supporting transitions such as integrating native species or alternative livestock models (e.g., managed bison systems) that align with environmental and market opportunities.
- Authorize and fund aggregation and marketing of alternative crops by expanding programs designed to build and grow the middle-of-the-supply-chain infrastructure essential to crop development and marketing. These programs include:
  - Farm Storage Facility Loan Program (FSFL).
  - Value-Added Producer Grants (VAPG).
  - Resilient Food Systems Infrastructure Program (RFSI).
  - Small Business Innovation Research (SBIR).
  - Business and Industry Loan Guarantee Program (B&I).
  - Local Food Purchase Assistance Program (LFPA).
  - Regional Food Business Centers.

### INFRASTRUCTURE

- Provide low-cost loans or grants to spur investment in mid-supply chain infrastructure by financing aggregation, processing, storage, and distribution for specialty crops, livestock, dairy, and grains to enable market access.
- Provide early-stage capital through grants, low-interest loans, or public-private equity partnerships to de-risk infrastructure development and attract long-term private investment.
- Ensure consistent and reliable funding through long-term, reliable federal commitments, which are critical to building functional regional supply chains.
- Expand shared-use infrastructure by increasing access to grants and loans for cooperatives and community-scale processing and storage facilities.
- Strengthen regional supply chains by aligning infrastructure investments with regional market development strategies to improve efficiency and resilience.

## Policy Context:

The concentration of American agriculture around a handful of commodity crops, primarily corn, soybeans, wheat, rice, and cotton, has been reinforced for decades by federal farm programs designed for a different era. Today, over 90% percent of U.S. cropland is planted with commodity crops, and farm income increasingly depends on federal payments rather than market returns. Expanding access to organic markets, export programs, biofuel incentives, and other value-added products can create genuine pathways to profitability. At the same time, rebuilding mid-supply chain infrastructure with the processing, aggregation, and storage capacity that connects farmers to buyers is key to unlocking the market diversification that farmers need to thrive. The role of the federal government is unmistakable. Several USDA programs procure products directly from farmers. Using the federal government's purchasing power to support crops grown with regenerative or sustainable practices will ensure a demand signal that incentivizes these practices.



### Challenge – Weather instability and market volatility that increase on-farm risk:

Weather instability and fluctuating market demand increase the risk farmers face in growing and marketing a crop. Farmers need access to on-farm income diversity that balances the uncertainty inherent in agricultural production.

## Policy Options:

- Expand agrivoltaics and wind energy on agricultural land, including under the Renewable Energy for America Program (REAP).
- Invest in silvopasture, which is the combination of trees on pastureland, to offer ranchers secondary income via timber, tree fruits, nuts, and other non-wood forest products.
- Create incentives for farmers to practice regenerative agriculture to increase profitability and decrease risk, including federal government set-asides in procurement or purchasing practices.
- Remove or simplify complexity in financial markets to enable farmer participation, including carbon crediting, natural capital, and ecosystem services markets. Establish a regulated marketplace with standardized and validated methodologies that provide security and certainty in the reduction of pollution and greenhouse gases (GHG) and align with corporate Scope 3 requirements.
- Invest in modernization of the rural electric grid and cooperative system to enable energy efficiency and renewable energy sources to meet growing demand.

## Policy Context:

On-farm income diversification is one of the most effective buffers against the volatility that characterizes modern agriculture. Agrivoltaic installations, where solar panels are co-located with crops or livestock, have demonstrated significant income stabilization benefits for participating farmers, with annual lease or revenue payments that can exceed traditional crop returns in low-productivity areas. Programs such as REAP should support farmers' choices for energy generation and efficiency on their private property and not be inhibited by political interference from Washington. Silvopasture systems provide similar resilience. By integrating trees into grazing land, ranchers gain access to timber, nuts, or fruit income while also improving the health and productivity of their livestock operations. USDA's Environmental Quality Incentives Program (EQIP) should boost investments by ensuring staff are properly trained to advise farmers on the economic value of silvopasture and the technical assistance to implement projects. These diversified systems are not alternatives to farming; they are a smarter way to farm. Additionally, carbon or nature-based credits or other strategies that support ecosystem services reward the farmer with additional income while making it financially beneficial to reduce pollution and stabilize the environment. Broader access to a modernized electric grid will ensure farmers have access to more markets while also saving critical resources on cleaner energy. Additionally, alternative uses for farmland, such as agrivoltaics or other renewable energy sources, can modernize the electric grid while expanding potential income streams for farmers.

BENCHMARK #1.2:

# Federal programs give farmers easy access to high-quality conservation, technical, and financial support, while markets and partnerships provide long-term income stability.

**FEDERAL AGRICULTURAL POLICY HAS THE POTENTIAL TO BE A TRUE SAFETY NET FOR FARMERS AND A PLATFORM FOR LONG-TERM RESILIENCE AND PROFITABILITY INSTEAD OF A BAIL-OUT PROGRAM THAT KEEPS PRODUCERS TIED TO OUTDATED FARMING PRACTICES.** To achieve that, programs must be redesigned to reduce input costs, align commodity support with actual economic conditions, and make conservation programs accessible to all farmers. This section provides policy options for four key challenges:

1. Rising input costs that erode farm margins
2. Commodity support programs that distort markets and lock farmers into narrow crop choices
3. Complex conservation programs that are difficult for farmers to navigate
4. Insufficient legal authority to protect natural resources for all farmers



**Challenge – Rising input costs that erode farm margins:** Livestock and row crop farmers spend a large portion of their operating budgets on feed, soil inputs, fertilizer, and pesticides. As these costs rise, farmers' margins decrease or disappear entirely.

## Policy Options:

- Incentivize farmer adherence to the right source, right rate, right time, and right place for application of fertilizer and other crop inputs.
- Increase research investment into the use of biologics and biological inputs as cost-effective alternatives to synthetic chemicals, reducing input dependency and restoring natural soil processes.
- Invest in research and technical assistance to improve efficiency of key inputs or reduce the volume of required inputs, saving farmers money.

## Policy Context:

Input costs have risen dramatically in recent years, with fertilizer and pesticide prices reaching historic highs. A shift toward domestically produced biological inputs may reduce farmer exposure to synthetic input price volatility while also improving long-term soil function. Emissions of nitrous oxide from fertilizer application and methane from enteric fermentation combined account for approximately 80% of U.S. agricultural emissions and roughly $99 billion in annual costs to farmers.[1] Improving nitrogen use efficiency and feed conversion efficiency therefore holds real promise both to save farmers money and to reduce GHG emissions.



**Challenge – Commodity support programs that distort markets and lock farmers into narrow crop choices:** The Agriculture Risk Coverage (ARC) and Price Loss Coverage (PLC) programs use an outdated subsidy system that distorts markets and locks farmers into commodity crops. Minimum price floors no longer reflect the actual cost of producing a crop and instead have an inflationary effect on crop inputs.

## Policy Options:

- Adjust ARC and PLC to reimburse revenue and income loss instead of yield and historic prices. Disallow federal taxpayer dollars to be used to prop up crop production in geographies or climates that are inhospitable to certain crops.
- Ensure ARC and PLC payments reflect actual crops planted each year instead of the historic crops planted on those acres. Pay farmers for ecosystem services and carbon sequestration instead of yield, creating a direct connection between federal investment and measurable environmental benefit.

## Policy Context:

The commodity support programs at the heart of the *Farm Bill* were designed for a different era of American agriculture. Today, reference prices embedded in ARC and PLC can discourage diversification and push land rents higher by signaling a guaranteed floor for narrow commodity production. A shift toward revenue-based support that also compensates farmers for ecosystem services will better reflect actual farm economics while incentivizing practices like soil health amendments, cover cropping, and biodiversity practices that make farming more resilient over time.

[1] United States Environmental Protection Agency. (2026, March). *Agriculture Sector Emissions.* https://www.epa.gov/ghgemissions/agriculture-sector-emissions.

## Challenge – Complex conservation programs that are difficult for farmers to navigate: Conservation programs are complicated for farmers to implement and are not practical or accessible to all farmers. Paperwork burden, which can include multiple steps across several phases, and program complexity overwhelm producers and limit participation.

### Policy Options:

- Streamline conservation program applications and adjust contracting or reimbursement timelines to remove barriers like land use limitations, misaligned cost expectations, and assumed ineligibility.
- Utilize cooperative agreements to expand and simplify technical assistance, especially for beginning farmers and ranchers who lack the expertise to navigate existing programs.
- Authorize Conservation Technical Assistance (CTA) funds as mandatory spending to stabilize and increase funds to USDA-partner organizations like cooperative extension, technical service providers, and others that help farmers navigate real-world challenges with practical, hands-on support tailored to their needs.
- Increase the current set-aside within EQIP from 5% to 30% for small landowners and producers whose applications cannot compete with larger landowners' high impact scores.
- Authorize the Natural Resources Conservation Service (NRCS) to automatically approve farmers for certain popular and universally valuable soil health practices and cost-share to flow to farmers without a complicated application process.

### Policy Context:

Conservation programs offer significant financial and environmental benefits but only to those who can successfully navigate the application and ranking process. For many small-sized and beginning farmers, the application complexity of EQIP, the Conservation Stewardship Program (CSP), and related programs acts as an effective barrier to entry. Simplifying applications, shortening contracting timelines, and expanding technical assistance are not bureaucratic reforms. They are critical changes that ensure conservation dollars reach the producers who need them most.

## Challenge – Insufficient legal authority to protect natural resources for all farmers: USDA programs do not adequately assist farmers in protecting natural resources or do not have adequate legal authority to be effective for all farmers.

### Policy Options:

- Expand enrollment and climate incentive payments in the Conservation Reserve Program (CRP). Improve coordination between CRP and EQIP to enable farmers' access to program dollars that encourage healthy land stewardship, including reseeding, grazing plans, and infrastructure like virtual fencing and water systems.
- Update and incorporate climate change mitigation into CSP and EQIP practice standards.
- Enforce existing legal requirements and expand conservation compliance to ensure that federal taxpayer dollars do not incentivize negative environmental outcomes.
- Consider a new working lands component of CRP to encourage the restoration of marginal lands into grass specifically for sustainably grazing livestock.
- Develop scientific and economic data and models that quantify the impact, return on investment, and success of sustainable practices, providing farmers with facts that allow them to understand the benefit of those practices.
- Partner with specialized organizations, like certified crop advisors, and expand the network of Technical Service Providers (TSPs) to assist farmers in navigating the application process, alleviating the bottleneck at local NRCS offices.
- Authorize NRCS to establish cooperative agreements with state agencies to implement programs at the local level.
- Authorize the Farm Service Agency (FSA) to enroll farmers in certain EQIP practices at the same time farmers are in the office to provide acreage reporting or enroll in crop insurance.

### Policy Context:

**CONSERVATION PROGRAMS WORK BEST WHEN THEY ARE ACCESSIBLE, ADEQUATELY FUNDED, AND LEGALLY EMPOWERED TO ACHIEVE RESULTS.** According to the U.S. Government Accountability Office (GAO), USDA does not currently enforce conservation compliance.[2] Further, coordination between the FSA, which manages CRP, and the NRCS, which manages EQIP, has historically been limited, leaving farmers unable to layer program benefits in ways that would dramatically increase conservation outcomes. At the same time, small-sized farmers are systematically disadvantaged in program competitions dominated by large operations. A dedicated set-aside, combined with stronger technical assistance, levels the playing field and ensures conservation dollars are invested where they can do the most good.

[2] United States Government Accountability Office. (2021, May). *Farm Programs: USDA Should Take Additional Steps to Ensure Compliance with Wetland Conservation Provisions*, GAO-21-241. https://www.gao.gov/products/gao-21-241.

BENCHMARK #1.3:

# Federal policy choices and investments expand access to land ownership, reduce financial barriers to entry, and create the financial and market infrastructure that allows young and beginning farmers to own, operate, and build equity in the land they work.

**SOARING LAND VALUES AND ACCELERATING CONSOLIDATION ARE CLOSING THE DOOR ON THE NEXT GENERATION OF FARMERS, MAKING IT HARDER FOR YOUNG AND BEGINNING PRODUCERS TO ENTER AGRICULTURE AND HARDER FOR SMALL- AND MID-SIZED OPERATORS TO GROW.** As today's landowners retire, federal policy must ensure that farmland passes to working producers and not large, consolidated operations or disinterested, non-farming owners. This section provides policy options for two key challenges:

1. Soaring land values and stiff competition for land
2. Unclear or unresolved land title



**Challenge – Soaring land values and stiff competition for land:** Soaring land values and stiff competition for land, increasingly from institutional investors and large-scale operations, make it difficult for young and beginning farmers to enter agriculture or for small- and mid-sized farmers to expand. Aspiring and existing farmers face a compounding set of barriers: limited access to credit and financing tools designed for their scale, upfront capital requirements that exceed what traditional savings or financing can bridge, and lender uncertainty about agricultural risk that restricts the availability of loans. Many farmers also lack the business planning and financial management support needed to strengthen their creditworthiness or negotiate effectively with lenders and landowners.

## Policy Options:

- Expand access to credit, including farm credit and USDA loan programs, and financing tools tailored to beginning, small- and mid-sized farmers.
- Allow farmers to use 401(k) retirement savings as a down payment on farmland, reducing the upfront capital barrier to ownership.
- Direct USDA to invest in climate risk assessment tools and data so that lenders can better understand and price agricultural risk, improving farmers' access to financing by reducing lender uncertainty.
- Provide technical assistance for business planning and financial management to help small- and mid-sized farmers strengthen their creditworthiness and negotiate from a position of knowledge.
- Require USDA to conduct a study to better understand the current state of landownership and the unique barriers that farmers face in acquiring permanent land.
- Amend and fund the Commission on Farm Transition established in the 2018 Farm Bill to study land access and transition to inform policy that facilitates access to land.
- Provide cooperative agreements to organizations offering effective agricultural business management tools, such as the Center for Farm Financial Management (CFFM), to strategically engage in expanded outreach and offer technical assistance to young, beginning, small-sized, underserved, and specialty crop farmers.
- Support farmer and lender mediation programs that demonstrate success in reducing farmer bankruptcies.
- Authorize and fund the Distressed Borrowers Assistance Network (DBAN), a national initiative launched in September 2024 aimed at providing personalized support to financially distressed farmers and ranchers.

## Policy Context:

The average age of the American farmer is now 58 years old, and a significant wave of farmland transitions is coming in the next decade as the current generation of landowners retires.[3] Without intervention, that land is likely to be absorbed into larger, more consolidated operations or purchased by absentee investors or speculators. Expanding access to credit and financing for beginning farmers and reducing lender uncertainty through better climate risk data can shift the trajectory of that transition toward a more diverse, competitive, and resilient agricultural sector. In other sectors of the economy, waiving penalties for withdrawal of 401(k) funds has been helpful to alleviate upfront financial barriers, including for homeownership. A targeted approach to landownership for farmers will provide a similar benefit. Several other programs have also helped support farmers struggling with financial uncertainty, including mediation programs that help avoid bankruptcy, foreclosure moratoriums, and the DBAN, which connects borrowers with individualized assistance to help them regain financial stability. During prior economic crises, Administrations have also used temporary farmer foreclosure moratoriums to ease economic upheaval.

The average age of the American farmer is now

**58**

**YEARS OLD**

and a significant wave of farmland transitions is coming in the next decade as the current generation of landowners retire



[3] United States Department of Agriculture. (2022). *2022 Census of Agriculture.* https://www.nass.usda.gov/Publications/AgCensus/2022/index.php.



**Challenge – Unclear or unresolved land title:** Unclear or unresolved land titles prevent farmers from owning their land outright, exposing it to loss through purchase by wealthy non-operating landowners, absorption into large, consolidated operations, or conversion to non-agricultural uses.

## Policy Options:

- Adjust the Heirs' Property Relending Program to avoid direct loans to individuals in favor of grants and cooperative agreements for community-based nonprofit organizations that address and resolve heirs' property and fractionated land issues through legal technical assistance, education, and estate planning.
- Amend and fund the Land Access and Farmland Ownership Data Collection authorized in the 2018 *Farm Bill* to require the National Agriculture Statistics Service (NASS) to include in its Tenure, Ownership, and Transition of Agricultural Land (TOTAL) Survey information on absentee ownership, heirs' property, and the impact of farmland ownership trends on beginning farmers by race, gender, and ethnicity, as well as by state, county, and region.

## Policy Context:

Heirs' property, the land passed informally across family generations without clear title, leaves landowners vulnerable to forced partition sales that can strip generational wealth in a single legal proceeding. Better data on the scope of the problem, combined with targeted grant programs that connect affected landowners to legal assistance, will begin to address one of the most significant but least-discussed barriers to land access and ownership in American agriculture.

BENCHMARK #1.4:

# Public and private research drives innovation, equipping farmers and ranchers to anticipate and adapt to future challenges.

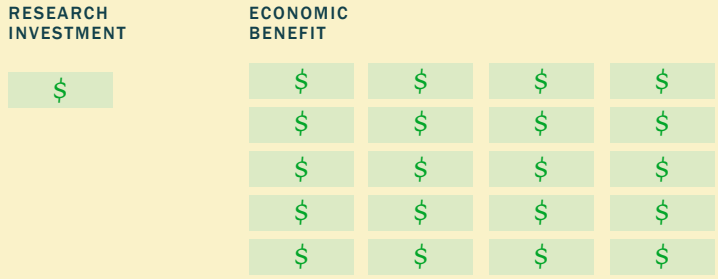
**AMERICAN AGRICULTURAL RESEARCH HAS LONG BEEN A DRIVER OF PRODUCTIVITY, PROSPERITY, AND FOOD SECURITY.** But underinvestment, regulatory bottlenecks, and a changing climate now threaten that edge. A dramatic reinvestment in public sector agricultural research and innovation is essential to feeding a growing world, equipping farmers for a changing climate, and keeping the United States at the frontier of agricultural science. This section provides policy options for four key challenges:

1. Slowing U.S. agricultural productivity growth against accelerating global demand
2. Shifting weather patterns that threaten the productivity of farmland
3. Regulatory bottlenecks that slow the deployment of agricultural and biotech innovation
4. Dependence for fertilizer on overseas production and energy-intensive manufacturing



# Public Investment in Agricultural Research

Public investment in agricultural research has been one of the highest-return investments in the history of the American economy, producing, on average, $20 in economic benefit for every $1 in research investment.




**Challenge – Slowing U.S. agricultural productivity growth against accelerating global demand:** U.S. agricultural productivity growth is slowing at precisely the moment global demand is accelerating. Global population is projected to grow by 1.5 billion over the next 25 years, driving a predicted 56% increase in food demand.[4] Without bold innovation, the only path to feeding the world runs through the destruction of the natural systems that make food production possible: drained aquifers, vanished grasslands, lost wetlands, and soils too depleted to grow the next harvest.or disappear entirely.

## Policy Options:

- Invest $100 billion over ten years in federally funded agricultural R&D. This threefold increase over current levels will drive productivity gains that reduce the need for agricultural land expansion.
- Stand up and fully fund the Agriculture Advanced Research and Development Authority (AgARDA) to support high-risk, high-reward research projects poorly suited to private market investment. AgARDA was authorized in the 2018 *Farm Bill* but has never been fully funded.
- Maintain and grow mandatory existing research investments through the Foundation for Food and Agriculture Research (FFAR), the Agricultural Research Service (ARS), the Economic Research Service (ERS), and the Sustainable Agriculture Research and Education (SARE) program.
- Shift research priorities toward nutrient-dense foods like fruits, vegetables, meat, and dairy, as well as minor crop improvement, market development, and diversified farming systems, rebalancing away from the longstanding concentration on traditional commodity row crops.

## Policy Context:

Public investment in agricultural research has been one of the highest-return investments in the history of the American economy, producing, on average, $20 in economic benefit for every $1 in research investment.[5] But that public investment has stagnated in recent decades, even as private research and development has concentrated on inputs and technologies suited to large commodity operations. Reinvestment at the scale of a $100 billion national moonshot as a fundamental reorientation of the research enterprise is what the moment requires.[6] AgARDA, modeled on the Advanced Research Projects Agency-Energy (ARPA-E) and the Defense Advanced Research Projects Agency (DARPA), is designed exactly for the kind of high-risk, transformative research that the market alone will not fund. To date, AgARDA has only received a fraction of its authorized funding, severely limiting its effectiveness.[7]

[4] Ranganathan, J., Waite, R., Searchinger, T., & Hanson, C. (2018, December). *How to Sustainably Feed 10 Billion People by 2050, in 21 Charts.* World Resources Institute. https://www.wri.org/insights/how-sustainably-feed-10-billion-people-2050-21-charts.

[5] United States Department of Agriculture Economic Research Service. (2007, September). *Economic Returns to Public Agricultural Research.* https://ers.usda.gov/sites/default/files/_laserfiche/publications/42826/11496_eb10_1_.pdf?v=56912.

[6] Food Security Leadership Council. (2026, March). *A Call to Rebuild U.S. Leadership in Food and Agricultural R&D.* https://www.foodsecurityleadership.org/analysis-post/a-call-to-rebuild-u-s-leadership-in-food-and-agricultural-r-d.

[7] National Association of State Departments of Agriculture, Agricultural Coalition. (2025, April). *Coalition letter of support for Agriculture Advanced Research and Development Authority funding.* https://www.nasda.org/coalition-letter-of-support-for-agriculture-advanced-research-and-development-authority-appropriations/.

## Challenge – Shifting weather patterns that threaten the productivity of farmland:

Shifting weather patterns are moving suitable growing regions for key crops, threatening the productivity of land that American farmers have worked for generations. Farmers need research-backed tools and strategies to adapt their operations before those shifts outpace their ability to respond.

### Policy Options:

- Direct USDA ARS to develop new crop varieties adapted to wider temperature ranges through targeted breeding and agronomy research.
- Authorize, reinstate, and fund USDA Climate Hubs to provide regionally specific climate data, adaptation guidance, and farmer outreach.
- Prioritize research on livestock and climate, including cattle enteric methane emissions, by expanding USDA testing facilities, funding basic and applied methane research, and developing low-cost measurement technology, and modernize the U.S. Food and Drug Administration (FDA) regulatory pathways for environmentally beneficial livestock feed additives.
- Transform nitrogen application systems to reduce both producer costs and nitrous oxide pollution through precision application research, diversified rotations, development of nitrogen-efficient crop varieties, and research on manure-nitrogen capture and recycling.

### Policy Context:

Climate adaptation in agriculture is not a future challenge – it is a present one. Corn and soybean yields in parts of the Midwest are already showing weather-related volatility, and drought conditions in the U.S. are breaking records. Zoonotic disease and plant pests are spreading into new geographic regions with little experience or resources to counter the invasion. The research institutions and extension networks that once helped farmers navigate pest outbreaks and drought have been chronically underfunded. Reinstating and formally authorizing the USDA Climate Hubs and investing in climate-resilient crop varieties will give farmers the tools they need to adapt before the window for action closes.

## Challenge – Regulatory bottlenecks that slow the deployment of agricultural and biotech innovation:

American agricultural and biotech innovators face years-long approval bottlenecks at federal agencies, slowing the deployment of genetically engineered crops that could reduce input costs, improve climate resilience, and expand food production. Smaller developers are particularly disadvantaged by a complex, multi-agency regulatory system they lack the resources to navigate.

### Policy Options:

- Improve coordination and reduce duplication across USDA, FDA, and the U.S. Environmental Protection Agency (EPA) for the review of plants, animals, biopesticides, and microbes developed through biotechnology.
- Modernize regulatory frameworks to reflect scientific advances, including aligning the level of regulatory review with the actual hazard risk that the innovation entails. Create a clear, accessible regulatory pathway for smaller biotech developers entering the federal system for the first time.
- Streamline FDA's regulatory approval pathways and timelines and reduce confusion for feed additives that demonstrate environmental co-benefits.

### Policy Context:

The United States led the world in agricultural biotechnology for decades, but the regulatory framework governing its deployment has not kept pace with the science. The result is a system that is simultaneously too slow for innovators and too complex for smaller developers, effectively ceding competitive ground to countries that have moved faster and more efficiently. Streamlining the multi-agency review process and creating a dedicated pathway for smaller developers can restore American leadership in agricultural innovation without sacrificing the rigor that public confidence requires.



**Challenge – Dependence for fertilizer on overseas production and energy-intensive manufacturing:** Fertilizer is indispensable to crop production, yet its manufacture is energy-intensive, polluting, and heavily dependent on overseas production, creating cost volatility and supply chain vulnerability for American farmers.

## Policy Options:

- Invest in the transition to domestic green fertilizer production through existing U.S. Department of Energy (DOE) and USDA programs and funding.
- Adjust tax incentives to domestically produce green hydrogen and promote development of end uses like fertilizer.

## Policy Context:

Fertilizer price spikes driven by energy markets, supply chain disruptions, and geopolitical events can have a devastating effect on farm margins in a single growing season. A domestic green fertilizer industry will reduce that vulnerability while also positioning American agriculture to meet growing global demand for sustainably produced food. By lowering import costs and producing more domestic supplies of fertilizer, food costs for consumers should decline. Further, approximately 21% of U.S. hydrogen output is currently used to produce ammonia for fertilizers.[8] Transitioning that hydrogen to cleaner production methods requires federal research investment and policy support to drive costs down and enable broad adoption. The transition will require federal investment, but the long-term returns in supply chain security and farmer economic stability are substantial.

[8] United States Energy Information Agency. (2024, April). *U.S. refiners and chemical manufacturers lead hydrogen production and consumption.* https://www.eia.gov/todayinenergy/detail.php?id=61763.

**BENCHMARK #1.5:**

# Nationwide, farmers grow crops in healthy, biologically active, and nutrient-rich soils, reducing their reliance on costly chemical inputs and increasing their economic sustainability.

**SOIL HEALTH IS THE FOUNDATION OF A STRONG, RESILIENT FARMING ECONOMY, LEADING TO INCREASED YIELDS AND LOWER COSTS FOR PRODUCERS.** As Franklin Roosevelt observed, a "nation that destroys its soil destroys itself."[9] Most American farmers today produce crops on depleted soils, caught in a costly cycle of synthetic inputs that substitute for the natural biological processes healthy soil provides. This creates a self-reinforcing cycle where degraded soils demand more inputs, inputs further degrade soil biology, and margins erode. This section provides policy options for three key challenges:

1. Depleted soils that lock farmers in a costly synthetic input cycle
2. Suppressed biodiversity that limits crop options and ecological resilience
3. Nitrogen loss that reduces return on investment and degrades water quality



[9] University of California at Santa Barbara American Presidency Project. (1937, February). *Letter to all State Governors on a Uniform Soil Conservation Law.* https://www.presidency.ucsb.edu/documents/letter-all-state-governors-uniform-soil-conservation-law.

## Challenge – Depleted soils that lock farmers in a costly synthetic input cycle: Most American farmers produce crops on depleted soils, caught in a costly cycle of synthetic inputs that substitute for the natural biological processes healthy soil provides.

### Policy Options:

- **DIRECT USDA TO DEVELOP STANDARDIZED SOIL HEALTH METRICS AND OUTCOME MEASUREMENTS TO ENSURE CONSISTENCY, TRANSPARENCY, AND OBJECTIVITY IN EVALUATING CONSERVATION PRACTICES, CREATING A COMMON LANGUAGE FOR FARMERS, LENDERS, AND POLICYMAKERS.**
- Expand technical assistance for difficult-to-implement soil health practices, ensuring that willing producers have hands-on troubleshooting support before obstacles cause them to abandon the effort.
- Incentivize adoption of precision agriculture technology to eliminate wasteful and costly over-application of inputs, targeting inputs precisely where and when they are needed.
- Accelerate investment in biological inputs as cost-effective alternatives to synthetic chemicals that restore, rather than replace, natural soil processes.
- Integrate soil health metrics into land valuation, farm lending, and financing decisions. Well-functioning soils reduce production risk and input dependency, making soil health a legitimate and measurable factor in creditworthiness.

### Policy Context:

Healthy soils can increase yields by as much as 5% and meaningfully reduce production risk. Yet soil health is almost entirely absent from the financial and insurance frameworks that govern how farmers access capital and manage risk. By developing standardized soil health metrics and integrating them into lending and insurance decisions, federal policy can align financial incentives with the practices that make farms more productive and more resilient over time. Biological inputs represent a particularly promising and underinvested opportunity by restoring natural soil function at a fraction of the cost of the synthetic inputs they replace.



## Challenge – Suppressed biodiversity that limits crop options and ecological resilience: Depleted soils suppress biodiversity, limiting the range of crops a farmer can viably grow and reducing the ecological resilience of the farming system as a whole.

### Policy Options:

- Remove federal barriers that discourage continuous living cover and over-winter cash crops, including policy obstacles within the FSA and Risk Management Agency (RMA) that currently discourage or penalize cover cropping.
- Redesign incentive structures to encourage Integrated Pest Management (IPM) systems, reducing dependence on synthetic chemical applications through rotational grazing with virtual fencing, expanded access to non-chemical pest management alternatives, and systems-level farm design.
- Fund research into soil amendments including biochar and enhanced rock weathering, which show promise for improving crop production, increasing climate resilience, and reducing input costs.

### Policy Context:

Biodiversity in farming systems is both an environmental goal and an economic one. Diverse cropping systems, cover crops, and integrated pest management have all been shown to reduce input costs, improve yields over time, and increase farm resilience to weather variability. Yet federal programs have historically penalized the practices that promote biodiversity, treating cover crops as a risky practice for crop insurance purposes and failing to compensate farmers for the ecological services that diverse systems provide. Removing those barriers is the first step toward more biologically productive agriculture.



**Challenge – Nitrogen loss that reduces return on investment and degrades water quality:** Excess nitrogen leaches from farm soils before crops can absorb it, simultaneously reducing the return on farmers' fertilizer investment, degrading drinking and recreational water quality, and contributing to GHG emissions.entirely.

## Policy Options:

- Create a nitrogen surplus reduction program built around a tiered payment system tied to measurable outcomes. Combine nitrogen use efficiency and nitrogen balance metrics, calibrated to regional and cropping-system contexts and structured to recognize early adopters while encouraging continuous improvement.
- Establish a national nitrogen initiative anchored by a stakeholder-driven coalition to combine federal coordination with broad industry, academic, and producer partnerships to improve nitrogen use efficiency across American agriculture. The initiative will advance nitrogen loss monitoring, measurement, and verification; fund proven and emerging loss-reduction solutions; and work toward a globally harmonized, performance-based system that reduces avoidable reactive nitrogen losses while rewarding producers with tiered payments tied to verifiable improvements in nutrient efficiency and balance.

## Policy Context:

Nitrogen loss is one of the most costly and consequential inefficiencies in American agriculture. Farmers over apply and pay for nitrogen that never reaches their crops, while that excess nitrogen degrades waterways from the Midwest to the Gulf of Mexico. A tiered payment system that rewards measurable improvements in nitrogen use efficiency can turn this inefficiency into an opportunity, improving farm margins, reducing environmental damage, and positioning American agriculture as a global leader in sustainable nutrient management.

BENCHMARK #1.6:

# Federal crop insurance accurately measures risk, appropriately prices that risk for the market, and incentivizes de-risking practices.

**FEDERAL CROP INSURANCE IS INTENDED TO PROTECT FARMERS FROM THE INHERENT RISKS IN PRODUCING A CROP.** However, in practice, its structure rewards monocropping, penalizes innovation, and subsidizes predictable failure. Refiguring crop insurance to accurately price individualized risk, incorporate soil health, and accommodate diverse cropping systems will protect producers, safeguard taxpayer dollars, and build the long-term resilience of American farmland. This section provides policy options for five key challenges:

1. Risk calculations that ignore soil health management
2. Lending requirements that effectively mandate program crop participation
3. Structural bias against conservation practices, organic production, and transition to new crops
4. Crop insurance design that discourages diversification
5. An RMA that is too slow to approve innovative insurance products and fails to proactively and appropriately manage risk



## Challenge – Risk calculations that ignore soil health management:

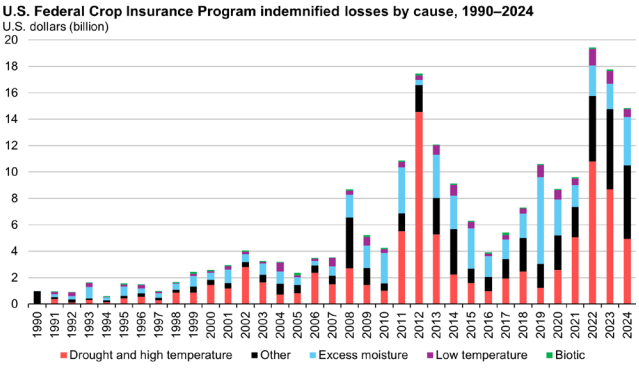
crop insurance risk calculations do not account for soil health management, even though healthy soils can increase yields by as much as 5% and meaningfully reduce production risk. Without a shared, standardized data infrastructure, policymakers cannot accurately price agricultural risk or measure the co-benefits of conservation practices, leaving the field to private insurers who use proprietary data to cherry-pick the most actuarially sound farms and hand the riskiest operations off to the federal government.

### Policy Options:

- Create a common conservation agriculture data system enabling government agencies and external stakeholders to collect, share, and analyze datasets linking on-farm outcomes to risk reduction over time. This data system can be managed by USDA or through a partner university.
- Collect nationwide data on conservation co-benefits beyond carbon capture, including soil health, water quality, water quantity, and biodiversity, to build a more complete picture of farm-level risk.
- Integrate soil health metrics into crop insurance risk calculations, recognizing that well-managed soils reduce yield volatility and taxpayer exposure.

### Policy Context:

The federal crop insurance program paid out nearly $20 billion in indemnities in 2023, averaging a 17% increase per year since 2000, with drought and high temperatures the overwhelmingly leading cause of indemnified losses.[10] Yet the actuarial models underlying those payments largely ignore one of the most powerful predictors of farm yield stability: soil health. Integrating standardized soil health metrics into risk calculations will not only improve the accuracy of insurance pricing but also create a powerful financial incentive for farmers to invest in practices that reduce risk over time. Better data infrastructure makes this possible, and the federal government is uniquely positioned to build it.




Source: United States Department of Agriculture Economic Research Service. (2025, September). *Risk Management - Crop Insurance at a Glance.*

## Challenge – Lending requirements that effectively mandate program crop participation:

Banks routinely require farmer participation in federal crop insurance and commodity support programs like ARC and PLC as a condition of lending, effectively mandating that farmers only grow insurable crops with the most generous coverage and penalizing non-insurable crops or crops with little data. Simultaneously, crop insurance continues to subsidize acres with repeated loss histories rather than redirecting support toward transition and recovery.

### Policy Options:

- Authorize RMA to pay farmers to transition away from repeat-loss acres rather than continuing to subsidize predictable failure. Reduce premium subsidies and coverage levels for chronically failing acres over time while offering a credible, voluntary transition payment as an alternative.
- Educate and incentivize local insurance agents to offer micro farm policies that serve small-sized and beginning farmers currently underserved by standard coverage options.

### Policy Context:

Some acres fail year after year, and federal crop insurance pays year after year. This is not risk management – it is a subsidy for crops, practices, or geographic regions that are not viable. A transition payment program that compensates farmers for shifting away from chronically loss-prone acres toward more productive or diversified uses will better serve both farm profitability and taxpayer interests. At the same time, the link between lending requirements and commodity program participation creates a structural lock-in that prevents farmers from exploring alternatives, even when those alternatives would be more profitable.

[10] United States Department of Agriculture Economic Research Service. (2025, September). *Risk Management - Crop Insurance at a Glance.* https://www.ers.usda.gov/topics/farm-practices-management/risk-management/crop-insurance-at-a-glance.

## Challenge – Structural bias against conservation practices, organic production, and transition to new crops:

Crop insurance is structurally biased toward yield consistency. This means that any practice that temporarily reduces yield, even one that builds long-term strength and resiliency, can disqualify a farmer from coverage or trigger a loss. This can effectively block farmer participation in conservation or organic transitions and penalizes exactly the practices federal policy should be encouraging.

### Policy Options:

- Reinstate the Post-Application Coverage Endorsement (PACE) program or similar mechanisms to de-risk a farmer's ability to optimize nitrogen application rates without triggering crop insurance loss.
- Establish new pilot insurance programs to de-risk conservation practices, agroforestry systems, and perennial crops.
- Pilot federal revenue- or profit-based insurance models for alternative and cover crops that account for the risk-reducing benefits of regenerative agriculture.
- Commission a study on the outcomes of allowing cover crop seed harvesting without loss of insurance eligibility.

### Policy Context:

The penalty that crop insurance imposes on conservation transitions is one of the most significant structural barriers to improving American farm soil health. A farmer who plants a cover crop, reduces synthetic inputs, or begins an organic transition faces the prospect of losing coverage or receiving lower indemnities during the years when yields are temporarily lower. Pilot insurance programs designed specifically for conservation transitions and revenue-based models that account for the full economic picture of a farm will remove those penalties and accelerate adoption of practices that benefit everyone.

A farmer who plants a cover crop, reduces synthetic inputs, or begins an organic transition faces the prospect of losing coverage or receiving lower indemnities during the years when yields are temporarily lower.

## Challenge – Crop insurance design that discourages diversification:

Crop insurance program design, particularly Actual Production History (APH) requirements, transitional yield models, and the complexity of Whole Farm Revenue Protection (WFRP), creates strong incentives for continuous monocropping and discourages farmers from adding new crops, specialty crops, or alternative grains.

### Policy Options:

- Adjust the current county-level crop production averages, also known as transitional yields or T-yields, to reflect current production potential rather than outdated historical models.
- Shorten the APH adjustment period for farmers adding new crops into rotations. Pilot a new crop insurance option that protects producers against short-term APH losses during transition periods.
- Allow crop insurance based on regional yield averages to lower the barrier to entry for new and alternative crops.
- Pilot federal revenue- or profit-based insurance models for alternative crops and cover crops grown for seed that account for the risk-reducing benefits of regenerative agriculture.
- Simplify WFRP administration at the agent level to increase adoption among producers currently deterred by its complexity.

### Policy Context:

WFRP is, in theory, one of the most farmer-friendly products in the federal crop insurance portfolio because it covers the whole operation rather than individual crops. In practice, its complexity, compared with traditional single-crop insurance products, deters agents from offering it, insurance companies from investing in it, and farmers from enrolling in it. Simplification, combined with reforms to T-yields and APH requirements, will open the door to genuine diversification for hundreds of thousands of farmers who currently feel locked into commodity monocropping by the insurance system.



## Challenge – An RMA that is too slow to approve innovative insurance products and fails to proactively and appropriately manage risk:

**THE RMA IS STRUCTURALLY BACKWARD-LOOKING, FUNCTIONING AS A BARRIER TO INNOVATION RATHER THAN A FACILITATOR OF IT.** The current 508(h) process for approving new federal crop insurance products is slow and cumbersome, preventing innovative coverage options from reaching farmers in a timely way and disproportionately burdening smaller developers and farmer cooperatives who lack the resources to navigate a complex, multi-year process.

## Policy Options:

- Establish a fast-track approval pathway within the 508(h) process for insurance products that address conservation practices, alternative crops, or climate adaptation, with a mandatory decision timeline of no more than 12 months.
- Create a pre-submission consultation process at RMA so that developers receive early technical feedback before investing in a full application, reducing costly revisions and delays.
- Require RMA to publish clear, standardized submission guidelines and evaluation criteria so that applicants, particularly smaller developers and farmer cooperatives, can navigate the process without expensive legal or consulting support.
- Authorize RMA to issue provisional approvals for pilot insurance products, allowing limited real-world testing of innovative coverage options while full review is completed.
- Direct RMA to conduct a comprehensive internal review of 508(h) processing bottlenecks and report findings and reform recommendations to Congress within 18 months.
- Invest in RMA staffing and actuarial capacity to reduce the review backlog that drives much of the current delay, ensuring that process reforms are matched by the institutional capacity to execute them.

## Policy Context:

The 508(h) process for federal crop insurance was designed to allow private developers to bring innovative insurance products to market. In practice, it functions as a multi-year gauntlet that only well-resourced applicants can navigate. The result is a crop insurance portfolio dominated by products designed for large commodity operations, with very little coverage available for the diversified farms of the future. Fast-track pathways, provisional approvals, and adequate RMA staffing can transform the agency from a bottleneck into an engine of agricultural innovation.



CHAPTER 2:

# Growing Rural and Tribal Economies

## At America's founding, nearly all Americans from all backgrounds lived in rural areas.

Small farms, frontier settlements, and agricultural villages formed the backbone of our economy, laying the foundation for America's economic growth and eventual global leadership.

For Tribal Nations, however, this history began long before the founding of the United States. Indigenous peoples had developed prospering economies, sophisticated systems of governance, extensive trade networks, and stewardship of the lands and waters they managed for thousands of years. The expansion of the United States fundamentally altered those economies through displacement, broken treaties, forced relocation, and policies that limited Tribal self-determination. Despite these historic challenges, Tribal Nations have preserved their sovereignty, cultures, and economic resilience while continuing to contribute to the nation's prosperity.

Today, the United States is far more urbanized, yet rural communities and Tribal Nations remain a vital part of our nation's identity, economy, and way of life. Rural communities generate approximately $2.7 trillion in annual economic output, representing about 10% of U.S. gross domestic product (GDP).[11]

The U.S. Census reports about 66 million Americans, or roughly one in five people, live in rural areas. Approximately 10 million American Indians and Alaska Natives live in communities across the country.

Rural economies have evolved far beyond agriculture. Though farming remains important, manufacturing is now the leading industry in nearly 500 rural counties, alongside energy production, healthcare, logistics, finance, construction, tourism, defense, and advanced technology industries.[12] Rural America produces roughly 90% of the nation's energy,[13] grows nearly all of its agricultural commodities,[14] is home to almost half of all non-metropolitan exporting manufacturers,[15] and increasingly supports data centers and other next-generation industries. About two-thirds of our critical minerals are located in rural and Tribal places, playing an increasingly important role in America's energy and national security future.[16]

Tribal Nations are also major economic contributors. Tribal governments and Native-owned enterprises generate an estimated $125–$148 billion in annual economic activity and support more than 1.1 million jobs.[17] Tribal economies are also vital to Tribal sovereignty and self-determination among the 575 federally recognized tribes across the U.S. Each of these Tribes are sovereign governments, that have unique histories and relationships with the U.S. government and unique

[11] McKinsey Institute for Economic Mobility. (2025). *The promise and potential of rural America.* https://www.mckinsey.com/institute-for-economic-mobility/our-insights/the-promise-and-potential-of-rural-america.

[12] Gale, F. (1998, June). Rural Manufacturers in the Export Market. *Rural America/ Rural Development Perspectives, United States Department of Agriculture, Economic Research Service, vol 13*(2). https://ideas.repec.org/a/ags/uersra/289772.html.

[13] National Association of State Energy Officials. (2020, May). *Rural Data Resources for State Energy Planning and Programs.* https://www.naseo.org/data/sites/1/documents/publications/Final%20Rural%20Report%20May%2020201.pdf.

[14] American Farm Bureau Federation. (n.d.). *Fast Facts About Agriculture & Food.* https://www.fb.org/newsroom/fast-facts.

[15] Gale, F. (1998, June). Rural Manufacturers in the Export Market. *Rural America/ Rural Development Perspectives, United States Department of Agriculture, Economic Research Service, 13*(2). https://ideas.repec.org/a/ags/uersra/289772.html.

[16] Myles, D. (2024, February). *Critical minerals' tribal dilemma.* fDi Intelligence. https://www.fdiintelligence.com/content/cf820c9d-ed3d-574c-bc60-4a66f68cb79a.

[17] Colombe, J. & Taylor, R. (2021). *Tribal enterprises drive economic activity in Indian Country and beyond.* Federal Reserve Bank of Minneapolis. https://www.minneapolisfed.org/article/2021/tribal-enterprises-drive-economic-activity-in-indian-country-and-beyond.

cultures, languages, and relationships with the landscapes and communities in which they live. Tribal economies are expanding across a range of sectors, including energy, natural resource management, tourism, gaming, healthcare, manufacturing, and technology.

Although rural communities and Tribal Nations often face similar challenges, such as workforce shortages, infrastructure needs, housing constraints, lack of access to capital, and unreliable or unavailable broadband connectivity, many of the underlying causes are different. Many rural communities are adapting to decades of economic restructuring, population changes, and shifts in traditional industries. Tribal Nations, however, continue to navigate the legacy of historic federal policies, jurisdictional complexities, and longstanding underinvestment.

The recommendations in this chapter reflect that distinction. Some are intended specifically for rural communities; others are designed to strengthen Tribal Nations and advance Tribal self-determination. Many recognize opportunities where both can benefit from more effective federal policies, engagement, and investments. These recommendations should not be interpreted as treating rural communities and Tribal Nations as a single constituency. Rural communities are geographic places with diverse economies and governance structures while Tribal Nations are sovereign governments with unique histories, legal authorities, and a government-to-government relationship with the United States. Where common challenges exist, they often require different solutions. The objective of this chapter is to help both rural communities and Tribal Nations build stronger, more resilient economies, expand opportunity, and preserve the natural landscapes, cultural heritage, and environmental resources that have sustained them for generations.

An honest conversation about investing in rural communities must also recognize an inherent policy tension. These communities are home to fewer Americans than ever before, making the per capita cost of infrastructure, public services, and economic development significantly higher than in more densely populated areas. With finite federal resources, policymakers must continually weigh investments across competing national priorities. The answer, however, is not to retreat from rural or Tribal places. These communities produce an outsized share of the nation's food, energy, natural resources, manufactured goods, and strategic assets while stewarding vast landscapes that support America's environmental, economic, and national security interests.

The question is not whether to invest, but how to invest wisely, targeting resources where they unlock long-term economic opportunity, strengthen self-sufficiency, leverage private capital, and generate benefits that extend far beyond the communities themselves. When approached strategically, investments in rural communities and Tribal Nations are not simply local expenditures; they are investments in America's long-term competitiveness, resilience, and prosperity.

**TO CREATE A THRIVING ECONOMY, THIS CHAPTER FOCUSES ON ACHIEVING THE FOLLOWING BENCHMARKS TO SUPPORT GROWING RURAL AND TRIBAL ECONOMIES:**

- **BENCHMARK #2.1:** Rural and Tribal economies thrive when the federal government empowers and enhances their quality of life. | 35
- **BENCHMARK #2.2:** Federal agencies coordinate across programs designated for rural and Tribal communities. | 43
- **BENCHMARK #2.3:** Rural and Tribal communities can access economic opportunities with strong capacity-building and technical assistance programming. | 47
- **BENCHMARK #2.4:** Outdoor access, recreation, and tourism provide economic opportunity without exacerbating persistent issues plaguing rural and Tribal communities. | 50
- **BENCHMARK #2.5:** Direct, flexible capital flows into rural and Tribal communities to support economic development. | 55

# Rep. Melanie Stansbury

## NM–01



**ACROSS THE U.S., THERE ARE 575 SOVEREIGN TRIBAL NATIONS AND THOUSANDS OF RURAL COMMUNITIES THAT ARE CENTRAL TO OUR NATION'S IDENTITY, CULTURES, AND ECONOMIES.** Yet, far too often, rural and Tribal communities are not prioritized in national policymaking when it comes to economic development and opportunity.

Prioritizing Tribal and rural communities is a choice we can make through policies that support tribal sovereignty and self-determination, invest in rural economies, and transform livelihood—while supporting sustainable economic development opportunities that are rooted in rural and Tribal communities' ways of life. To do so will require meaningful consultation with Tribal communities, creative and transformative policies, and community driven solutions led by local leaders.

As a native New Mexican, born and raised, this is the work I have spent my entire career dedicated to. New Mexico is a vast and rural place, where 23 sovereign Tribal Nations, centuries-old Spanish, Mexican and Land Grant communities, and rural and urban centers are home to farmers and ranchers, a thriving aerospace and high-tech industry, two National Labs, military installations, and dozens of federal agencies, a world-class arts economy, and vast swaths of public lands and natural resources. Our people are proud, diverse, and resilient and have lived on these lands for generations. They are innovators, creators, and keepers of tradition with ties to the lands, waters, cultures, and languages that make us who we are.

Yet, many New Mexicans, like others across the country, feel the daily strain of federal programs that are understaffed, underfunded, and difficult to navigate. As a Member of Congress, I have seen how much our Tribal and rural communities carry, and how the federal government has failed to match their needs with real investment. I have sat with Tribal leaders frustrated by federal bureaucracy and underinvestment. I have talked with rural hospital administrators bracing for shutdowns and families who still do not have clean water or broadband running to their homes. These are not isolated stories. They are the result of a federal system that was not built for Tribal and rural communities on their own terms.

This chapter of the Thriving Economy Project seeks to provide practical solutions that can help invest in and transform communities. Rural and Tribal communities generate trillions of dollars in economic opportunity and support millions of jobs. Yet they receive only a fraction of public, private, and philanthropic investment. This chapter lays out an agenda that builds on current successes. It calls for investing in housing, healthcare, transportation, and broadband infrastructure to help keep people rooted at home.

It calls for coordinating the more than 400 scattered federal programs meant to serve these communities, so that communities and families are not left navigating an impossible system. It calls for building on and investing in local leadership, capacity and technical assistance so that communities can compete for and use federal dollars. It calls for making sure outdoor economic opportunities strengthen local economies instead of straining housing, workforce, and emergency services. And it calls for delivering direct, flexible capital that lets local leaders build on what their communities need, not what a rigid federal formula assumes.

These ideas come from listening to the people doing the work every day: Tribal and local leaders, rural business owners, healthcare providers, and local officials who know exactly what stands in their way and often, exactly how to fix it.

Our hope is that this work of the SEEC Institute and this chapter will help Congress be a better partner to rural and Tribal communities: one that removes red tape instead of adding it and which treats the people who have sustained this country for generations as not only partners, but leaders in its future.

Melanie A. Stansbury

BENCHMARK #2.1:

# Rural and Tribal economies thrive when the federal government empowers and enhances their quality of life.



**ALL COMMUNITIES NEED THE SAME THINGS: ECONOMIC STABILITY, SOCIAL CONNECTION, PERSONAL DEVELOPMENT, ACCESS TO EDUCATION AND HEALTHCARE, AND SAFETY.[18] RURAL AND TRIBAL COMMUNITIES ARE NO DIFFERENT, BUT THE UNDERLYING CHALLENGES ARE UNIQUE DUE TO HISTORY, GEOGRAPHY, AND POPULATION DIVERSIFICATION.** For centuries, rural and Tribal communities have made immense contributions to the success of our country, including food supply, manufacturing, natural resources, critical materials, and energy. But without an economy that supports a strong quality of life and meets basic community needs, these communities and their workforce cannot continue to power the national economy.

Rural and Tribal communities succeed when the federal government supports physical and mental health, economic stability, social connection, and personal development and safety. When those needs are fulfilled and opportunity extends into the future, people stay in and near their home communities for generations. This section provides policy options for seven key challenges:

1. Lack of job security and high paying jobs
2. Minimal personal and professional development opportunities
3. Outdated energy and water infrastructure
4. A severe shortage of housing, community, and early childhood development facilities
5. Inaccessible and outdated transportation
6. A severe shortage of healthcare and emergency services
7. Outdated technology and underinvestment in telecommunications, broadband, and power grids that keep rural and Tribal communities connected and safe



[18] Chapter 3: Thriving, Affordable, Resilient Communities discusses many of these issues in further detail.

**Challenge – Lack of job security and high paying jobs:** Rural and Tribal communities face disproportionately high rates of poverty and unemployment. Approximately 300 rural counties experience persistent poverty, defined as counties where the poverty rate has been 20% or higher for the past 30 years.[19] While urban and suburban poverty rates average 10%–15%, rural poverty rates average 15%–16%, and in counties with concentrated American Indian and Alaska Native populations, Native poverty rates average 40%.[20] Rural, Tribal, and persistent poverty communities see volatile labor markets, which contribute to higher rates of unemployment and inconsistent economic stability. While some rural and Tribal economies comprise an increasing diversity of industries, many still rely on agriculture, tourism, and other seasonal jobs that dramatically fluctuate with the time of year and weather cycles. This compounds with the narrower range of industries, limiting alternative options during layoffs or off seasons.[21]

## Policy Options:

- Support and expand funding to the U.S. Department of Agriculture's (USDA) Rural Development (RD), the U.S. Small Business Administration (SBA), and other agencies' rural and Tribal business programs.
- Require all federal infrastructure projects to use Community Benefits Agreements (CBA) in persistent poverty counties and on Tribal lands.
- Ensure federal grant dollars support family-sustaining wages, including preferences for applications that include structures such as the union cooperative model.
- Fund and expand the U.S. Department of the Interior's (DOI) Tribal 477 programs, which allow Tribal Nations to tailor employment training, skills development, and other related trainings to meet local industry demands.

## Policy Context:

Historically, the federal government made significant efforts in rural and Tribal communities to enable stabilized business development opportunities, reduce unemployment, and support living wages.

Many federal agencies support rural and Tribal small business efforts. This includes USDA Rural Business Development Grants (RBDG), which support technical assistance, training, and other activities that promote development and expansion of small and emerging businesses in rural areas. Within SBA, rural and Tribal development is supported by rural business programs such as the Rural 504 Loan Program, the 7(a) Loan Program,[22] the Microloan Program,[23] the HUBZone Program,[24] and the State Trade Expansion Program (STEP).[25] When fully funded and staffed, these programs are instrumental in creating economic stability and supporting thriving small businesses in rural and Tribal communities. Unfortunately, federal support and investment in these programs have not kept pace with the need.

Requiring all federal infrastructure projects in rural and Tribal areas to use CBAs will directly ensure community engagement, participation, and economic benefit in federal investments. Similarly, if preference is given to companies that are structured under creative mechanisms like the union co-op model, the community can maintain and own the long-term assets rather than companies extracting the resources. The union co-op model empowers workers to share in the benefits of business ownership while still allowing for collective bargaining.[26] This will help increase living wages and benefits for workers, which in turn will enable rural and Tribal communities to maintain and keep their workforce longer term and offer higher discretionary incomes to support the local economy.[27]

In 1992, the *Indian Employment, Training and Related Services Demonstration Act* authorized the Tribal 477 Program, a federal initiative that allows federally recognized Tribes to consolidate multiple federal employment, training, and related social services programs into a single, comprehensive, Tribally-designed plan with one budget and a single report.[28] The program has since expanded to become more flexible and inclusive and now allows other eligible federal agencies to participate.[29] However, not all agencies with Tribal programs are included. Expanding to include those departments will enable access to a wider variety of grants.

[19] United States Department of Agriculture Economic Research Service. (2026). *Rural Poverty & Well-Being. Economic Research Service.* https://www.ers.usda.gov/topics/rural-economy-population/rural-poverty-well-being.

[20] United States Department of Agriculture Economic Research Service. (2026). *Rural Poverty & Well-Being. Economic Research Service.* https://www.ers.usda.gov/topics/rural-economy-population/rural-poverty-well-being.

[21] Sanders, A. (2026). *Employment & Education – Rural Employment and Unemployment.* United States Department of Agriculture Economic Research Service. https://www.ers.usda.gov/topics/rural-economy-population/employment-education/rural-employment-and-unemployment.

[22] Loans up to $5 million to help rural businesses secure working capital, purchase real estate, or refinance debt.

[23] Providing up to $50,000 through community-based lenders to serve rural and underserved markets.

[24] Giving preferential access to federal contracts to businesses located in historically underutilized business zones.

[25] Assists small businesses with exporting their goods globally, with targeted priority to rural applicants.

[26] Vazquez, K. (2021, February). *Union-Coops: Updating an Old Idea for Modern Needs.* OnLabor. https://onlabor.org/union-coops-updating-an-old-idea-for-modern-needs/.

[27] United States Department of Agriculture Rural Development. (n.d.). *Cooperative Services.* https://www.rd.usda.gov/programs-services/services/cooperative-services.

[28] *Indian Employment, Training and Related Services Demonstration Act of 1992*, Public Law 102-477, 106 Stat. 4661 (October 1992), https://www.govinfo.gov/content/pkg/STATUTE-106/pdf/STATUTE-106-Pg4661.pdf; Bureau of Indian Affairs, 477 Initiative (n.d.), https://www.bia.gov/bia/ois/dwd/477Initiative.

[29] *Indian Employment, Training and Related Services Consolidation Act of 2017*, Public Law 115-93 (December 2017), https://www.congress.gov/bill/115th-congress/senate-bill/1116.



**Challenge – Minimal personal and professional development opportunities:** The significant lack of private, public, and workforce development learning opportunities for rural and Tribal communities limits further ability to develop the local workforce.

## Policy Options:

- Require federal programs serving high need areas to use localized training initiatives before expanding outside workforce recruitment where appropriate.
- Fund and expand the *Workforce Innovation and Opportunity Act* (WIOA), the Industry-Driven Skills Training Fund, the Workforce Opportunities for Rural Communities (WORC), and other skills-based training programs within the U.S. Department of Labor (DOL).

## Policy Context:

The U.S. faces a significant geographic education and workforce deficit. Only 25% of rural adults hold a bachelor's degree compared to 37% of adults in suburban and urban areas, and only 55% of rural students enroll in college out of high school compared to 64% in suburban areas.[30] Approximately 75% of people living in education deserts are located in rural communities.[31] Additionally, rural communities can face significant workforce skills gaps. Local economies often rely on traditional industries, like logging, farming, and mining, while broader markets demand high-tech and digital skills. The migration of younger demographics away from rural communities leaves a disproportionately older workforce, resulting in business succession gaps.[32]

DOL has piloted programs to close this workforce and skills divide such as the Industry-Driven Skills Training Fund, the Employment and Training Administration (ETA), the Strengthening Community College Training Grants, and WORC. When funded and appropriately staffed, these programs have yielded higher lifetime earnings, higher employment rates, and stronger talent pipelines.[33]

### Geographic Education & Workforce Deficits

Adults in United States

| | RURAL | SUBURBAN/ URBAN |
|---|---|---|
| BACHELOR'S DEGREE | 25% | 37% |
| COLLEGE ENROLLED AFTER HIGH SCHOOL | 55% | 64% |

**75%** of people living in "education deserts" are located in rural communities

[30] Miller, A. (2025). *Preparing Rural Students for College and Beyond by Improving Access to Coursework*. Center for American Progress. https://www.americanprogress.org/article/preparing-rural-students-for-college-and-beyond-by-improving-access-to-coursework/.

[31] The Institute for College Access & Success. (n.d.). *National Rural College Completion Trends, Challenges, and Solutions*. https://ticas.org/wp-content/uploads/2023/12/2023.-Rural-College-Completion-National-Primer_v2.pdf.

[32] Bozarth, A. & Strifler, W. (2019). *Investing in America's Workforce: Strengthening Workforce Development in Rural Areas*. Fed Communities. https://fedcommunities.org/wp-content/uploads/2025/05/iaw-strengthening-workforce-development-rural-areas.pdf.

[33] LSI. (2025). *How Job Training Programs Drive Economic Growth: Empowering Workforces and Industries*. https://lsiwins.com/how-job-training-programs-drive-economic-growth/.

**Challenge – Outdated energy and water infrastructure:** Significant under-investment and outdated infrastructure in rural communities are causing residents to leave their home communities.

## Policy Options:

- Establish localized renewable microgrids to provide reliable, resilient, and affordable energy and complement the national power grid.
- Fund and expand the U.S. Environmental Protection Agency's (EPA) Get the Lead Out (GLO) Initiative, RealWaterTA, Lead Service Line Replacement Accelerators, and other federal programs that target rural and Tribal utility infrastructure.
- Expand EPA's Clean Water (CWSRF) and Drinking Water (DWSRF) State Revolving Funds to be available as grants in addition to loans. This will allow low-capacity rural, persistent poverty, and Tribal communities to access federal capital for deteriorating water and utility infrastructure.
- Offer flexible grants to municipal governments that plan to shift away from regional water plants to smaller, localized treatment facilities to minimize the need for miles of aged pipelines.
- Fund tribal water infrastructure projects including increased funding for Indian Health Service (IHS), irrigation infrastructure, and resolution of tribal water rights settlements.
- Establish tax credits for use and deployment of testing technologies, such as acoustic sensors, to find underground water leaks before pipes burst and clean water is wasted.
- Require data centers to use closed-loop cooling systems and other water reduction mechanisms that alleviate the energy and utility surges for the communities they operate in.

## Policy Context:

At certain moments in our nation's history, the federal government has made massive efforts to improve our domestic infrastructure. The New Deal was the largest investment in breadth and scope, and the *Infrastructure Investment and Jobs Act* (IIJA) the largest single financial investment in rural infrastructure in U.S. history. However, the need for infrastructure improvement of our bridges, interstate highway system, sewage and water pipes, and energy lines remains immense.

Simply put, the U.S. has not sufficiently invested sustained capital to renew and reform our infrastructure. This is true nationwide and acutely in rural and Tribal communities, placing additional burdens on their affordability challenges. Historically, lead and lead-caulked cast iron were used in sewer and water infrastructure and plumbing. Today, 20% of non-urban communities' public water utilities have lead, over 9% of all U.S. water service lines contain lead, and over 80% of households have some detectable trace of lead.[34] Due to outdated infrastructure, rural households carry energy burdens roughly 40% higher than metropolitan households, spending a median 4.4% of income on energy compared to 3.1%,[35] and one in three U.S. households report difficulty paying energy bills or keeping their home at a safe temperature.[36] Nearly 25% of households and 33% of homes with children in rural communities were unable to afford their energy costs over the summer of 2024,[37] and are increasingly displaced because of it.[38]

Beyond the IIJA, the federal government has piloted and extended federal programs to support utility infrastructure in rural and Tribal communities such as the GLO Initiative, the RealWaterTA, the Lead Service Line Replacement Accelerators program, the U.S. Department of Energy's (DOE) Tribal Energy Program, USDA's Water and Waste Disposal Program, and EPA's Drinking Water Set-Aside. Continuing to support flexible grants to local and Tribal governments, tax credits, and other lead replacement efforts and systems will support the health and economic viability of rural and Tribal communities.



**20%**
of non-urban communities' public water utilities have lead

**9%**
of all U.S. water service lines contain lead

**33%** of homes with children in rural communities were unable to afford their energy costs over the summer of 2024, and are increasingly becoming displaced because of it

[34] United States Environmental Protection Agency. (2026). *Basic Information about Lead in Drinking Water.* https://www.epa.gov/ground-water-and-drinking-water/basic-information-about-lead-drinking-water.

[35] American Council for an Energy-Efficient Economy, The High Cost of Energy in Rural America: Household Energy Burdens and Opportunities for Energy Efficiency (July 2018), https://www.aceee.org/research-report/u1806.

[36] U.S. Energy Information Administration, *2024 Residential Energy Consumption Survey* (2026), https://www.eia.gov/consumption/residential/.

[37] Price, M. (2025). *Recharging America.* Georgetown Journal on Poverty Law and Policy. https://www.law.georgetown.edu/poverty-journal/blog/recharging-america/.

[38] Shahyd, K. (2018). *Rural Families Overburdened with Higher Energy Costs.* Expert Blog. https://www.nrdc.org/bio/khalil-shahyd/rural-families-overburdened-higher-energy-costs.

**Challenge – A severe shortage of housing, community, and early childhood development facilities:** Decades of underinvestment have resulted in a shortage of accessible and habitable housing, a lack of early childhood development opportunities, and community facilities that are inaccessible or unable to be used in rural and Tribal communities. Additionally, insurance companies continue to raise premiums, placing an extreme demand on an already short housing and facility supply.

## Policy Options:

- Fund and expand rural and Tribal construction, reconstruction and renovation, and support programs.
- Establish subsidies or tax credits to companies that fund on-site early childhood development centers at their workplace in low-density and Tribal communities.
- Offer flexible funding for local municipalities to pinpoint gaps in early childhood development programs and support the Rural Child Care Innovation Program (RCCIP), Head Start, and the Childcare Development Fund (CCDF) in rural and Tribal communities.
- Establish grant programs to construct or upgrade rural childcare facilities to meet safety standards.
- Fund and expand USDA's Community Facilities program.
- Require insurance companies to disclose the data and catastrophe models they use for rate-setting and nonrenewal of insurance.
- Continue to support and fund the programs associated with low-income housing initiatives, such as Opportunity Zones.

## Policy Context:

The housing crisis in rural and Tribal communities is defined by a severe shortage of safe and affordable homes, acute infrastructure deficits, and underfunding. In Tribal communities alone, around 68,000 new units are needed to replace distressed housing. Over 15% of Tribal residents live in overcrowded homes compared to 2% of the larger U.S. population. Nearly 40% of on-reservation housing is considered substandard or inadequate, with 11% of those residents lacking plumbing compared to 1.2% nationwide.[39] Additionally, Tribal lands are often held in federal trust, making it difficult to provide standard private mortgages for building.[40] USDA, the U.S. Department of Housing and Urban Development (HUD), Bureau of Indian Affairs (BIA), and other federal departments have support programs for housing on Tribal land, including the Indian Housing Block Grant (IHBG), HUD's Section 184 Indian Home Loan Guarantee, the Housing Improvement Program (HIP), the Tribal HUD-Veteran Affairs Supportive Housing (HUD-VASH) program, and the Indian Community Development Block Grant (ICDBG). These programs need to be dramatically increased in scale and scope to meet current and ongoing needs on the ground.

For rural housing, the Single-Family Housing Direct Loans (Section 502), Housing and Repair Loans and Grants (Section 504), and programs supporting multi-family housing help those looking to renovate their homes and provide mortgage assistance for low-income earners. Unfortunately, these programs are chronically underfunded and oversubscribed, and often, upfront capital requirements crowd out those that need it most.

A lack of adequate community and childcare facilities is pushing rural and Tribal workers away from their communities. Roughly 29% of rural families report relocating specifically because of local childcare shortages. Among remote rural children under the age of five, 70% live in childcare deserts, and more than 75% of rural American Indian and Alaska Native populations lack available childcare.[41] Key federal programs such as the CCDF, the Tribal CCDF, Tribal Early Learning Initiative (TELI), RCCIP, the Tribal Maternal, Infant, and Early Childhood Home Visiting (MIECHV) program, and Head Start support early childhood care and development in rural and Tribal communities. Additionally, USDA's Community Facilities program offers large-scale, upfront, flexible capital for community facilities to fulfill several communities' needs, including childcare.

Housing insurance is also a significant hindrance for rural and Tribal residents looking to be homeowners, due to rising premiums, coverage gaps, and underinsurance. Increased natural disasters driven by climate change are causing insurance carriers to increase premiums, pricing families out, or drop coverage entirely for high-risk rural areas. Tribal homes are often inherited and therefore lack land titles, and due to proof of ownership requirements, they are excluded from traditional markets. Sovereign Tribal lands add another layer of complexity making mainstream insurers hesitant to underwrite or process claims. Manufactured homes are common in rural and Tribal areas, but most insurance carriers charge higher premiums or exclude them altogether.[42]

| | |
|---|---|
| ROUGHLY **29%** | of rural families report relocating specifically because of local childcare shortages |
| **70%** | of remote rural children under the age of five live in childcare deserts |
| OVER **75%** | of rural American Indian and Alaska Native populations lack available childcare |

[39] Blackwell, K. (2026). *Native American Housing*. National Low Income Housing Coalition. https://nlihc.org/explore-issues/policy-priorities/native-american-housing.

[40] Blackwell, K. (2026). *Native American Housing*. National Low Income Housing Coalition. https://nlihc.org/explore-issues/policy-priorities/native-american-housing.

[41] Blackwell, K. (2026). *Native American Housing*. National Low Income Housing Coalition. https://nlihc.org/explore-issues/policy-priorities/native-american-housing.

[42] Additional policy options on insurance can be found in Chapter 3: Thriving, Affordable, and Resilient Communities.

**Challenge – Inaccessible and outdated transportation:** Severe, long-term disinvestment has left significant portions of railways inoperable and many roads dangerous, compromising safety, constraining supply chains, and hindering people from accessing their workplaces.

## Policy Options:

- Increase and expand flexible transit models, such as on-demand scheduling and rideshare partnerships, to better serve low-density areas. Offer tax credits or subsidies to rideshare companies that serve low-density areas.
- Increase monetary support for dedicated transportation infrastructure within USDA RD, the U.S. Department of Transportation (DOT), DOI, and the Bureau of Land Management (BLM), working adjacent to rural and Native transportation solutions.
- Establish and fund flexible federal and state planning grants specifically for rural communities and Tribal governments to draft comprehensive transportation plans.
- Allow Tribal governments to maintain greater autonomy over transit routing, infrastructure, and safety priorities, and increase funding set asides to fund infrastructure improvements.

## Policy Context:

Reliable, consistent, and affordable transportation is a serious challenge for rural and Tribal communities. Today, 100 of the 575 federally recognized Tribes receive or have received funding from the Federal Transit Administration (FTA) for rural transit.[43] Nearly one in ten Tribal households do not have a vehicle, which is more than double the national average of 4%.[44] Additionally, due to underinvestment, rural and Tribal communities often face hazardous road conditions, lower ridership for fixed transit routes, and complex and overlapping jurisdictional authority, complicating access to longer distances and common routes. More than 17% of Tribal communities lack reliable transportation for daily living – compared to the national average of 5.7% – which makes it difficult to go to work and school, get groceries, and access healthcare centers.[45] According to the U.S. Department of Justice (DOJ), the crisis of missing and murdered Indigenous women and girls is also tied to having safe forms of transportation which is vital to help keep communities safe.[46]

Today, 100 of the 575 federally recognized Tribes receive or have received funding from the Federal Transit Administration (FTA) for rural transit.

The federal government has made some strides to address significant transportation gaps in rural and Tribal communities. DOT's Rural Opportunities to Use Transportation for Economic Success (ROUTES) Initiative is designed to address transportation infrastructure disparities in rural and Tribal communities, including safety, roadway design, and bridges. FTA's Formula Grants for Rural Areas program (Section 5311) funds public transportation in areas with populations under 50,000, and the Enhanced Mobility of Seniors and Individuals with Disabilities program (Section 5310) supports improved mobility for seniors and people with disabilities in highly critical, rural regions where public transit is limited. For Tribes, the Public Transportation on Indian Reservations Program, also referred to as the Tribal Transit Program (TTP), is designed to support transportation needs in the most extremely rural regions of Tribal communities. Additionally, the Rural and Tribal Assistance (RTA) Pilot Program at DOT provides legal, technical, and financial advisory services to design, plan, and deliver complex transportation infrastructure projects.

Certain pilot programs allow Tribes and rural communities to control the design and execution of transit without heavy bureaucratic approval. This includes the Tribal Transportation Self-Governance Program (TTSGP), which shows how the federal government can include and center rural and Tribal communities to avoid bureaucratic red tape and ensure success.

Although all of these programs have made strides to support access to transportation, there is still much to do. Increasing and expanding flexible transit models or combining transit services – such as combination services, carpool and vanpool programs, demand-response, and deviated fixed-routes – will support a greater percentage of Tribal and rural populations. Additionally, adding supplemental or flexible funds for Tribes and rural municipal governments to design their own transportation plans will ensure utility and effectiveness of federal tax dollars.



[43] Transportation Research Board of the National Academies. (n.d.). *Native Americans on the Move.* https://onlinepubs.trb.org/onlinepubs/tcrp/docs/TCRPH-38_Phase1brochure.pdf.

[44] Ndembe, E., Godavarthy, R., Mattson, J., & Hough, J. (2021). *Tribal Transit Study: Demographic Needs Indicators, Funding Needs and Livability.* Upper Great Plains Transportation Institute. https://www.ugpti.org/resources/reports/downloads/surtcom21-05.pdf.

[45] Sullivan, B. (2024). *Clean Public Transportation is Taking Indian Country the Extra Mile.* National Resources Defense Council. https://www.nrdc.org/bio/isabella-sullivan/clean-public-transportation-taking-indian-country-extra-mile.

[46] National Institutes of Justice (2016). *Research Report Violence Against American Indian and Alaska Native Women and Men.* https://www.ojp.gov/pdffiles1/nij/249736.pdf.




## Challenge – A severe shortage of healthcare and emergency services:

Chronic underfunding and low reimbursement rates, shrinking and aging populations, and severe staffing shortages are severely constraining healthcare access in rural and Tribal communities to close.

## Policy Options:

- Implement a standby capacity payment system for all payers that helps cover minimum fixed costs of keeping emergency departments and units open.
- Provide subsidies to health clinics that offer telemedicine expansion to low-density and Tribal communities.
- Offer tax credits and incentives to attract and retain primary care providers and specialists to medically low-density and underserved communities.
- Explore flexible network rules for rural and Tribal communities such as:
  - Allow distance- and time-based exceptions instead of strict provider-to-patient ratios in remote regions.
  - Reimburse IHS and Tribal facilities directly and match state–Tribal frameworks.
  - Cover traditional healers and community health workers as billable providers.
  - Mandate coverage for mobile crisis intervention teams and 24/7 mental health urgent care.
  - Ensure audio-only and video options are paid at the same rate as in-person visits.
  - Cover alternative emergency medical transport to behavioral centers instead of the default to distance hospital emergency rooms.

## Policy Context:

As of July 2026, more than 700 rural hospitals, about one-third of all rural hospitals nationwide, are at risk of closure, and over 260 of those are at immediate risk.[47] Low Medicaid and Medicare reimbursement rates, inadequate commercial insurance rates, and persistent workforce shortages compound to create a significant rural healthcare crisis.[48] The aging population nationwide, and in rural areas in particular, is outpacing the already significant demand for care, and significant cuts to rural Medicaid spending are causing the crisis to balloon.[49] Concurrently, it is estimated that 70% of people over 65 will require some form of long-term care, but most health insurance plans, including Medicare, do not cover it, and Medicaid offers only partial coverage.[50]

The federal government and various policy institutions have proposed efforts to combat the dire situation. Supporting and expanding existing programs and policies, such as the Rural Health Transformation (RHT) Program, the Rural Emergency Hospital (REH) Designation, and other tax credits and incentives to attract, retain, and train a talented workforce can avert the crisis and ensure these communities can access the healthcare they need and deserve. Improving access to quality healthcare remains critical to the long-term prosperity of rural and Tribal communities, and there is no question that significant work remains. These issues deserve dedicated attention, well beyond the recommendations included in this report.

[47] Center for Healthcare Quality and Payment Reform, *Rural Hospitals at Risk of Closing* (July 2026), https://chqpr.org/downloads/Rural_Hospitals_at_Risk_of_Closing.pdf.

[48] Bennett, K., Horstman, C., Lewis, C., & Shih, A. (2026). *Why Rural Hospitals Are Facing a Funding Crisis — and How It Could Get Worse*. Commonwealth Fund. https://www.commonwealthfund.org/publications/explainer/2026/feb/why-rural-hospitals-face-funding-crisis-how-it-could-get-worse.

[49] Bennett, K., Horstman, C., Lewis, C., & Shih, A. (2026). *Why Rural Hospitals Are Facing a Funding Crisis — and How It Could Get Worse.* Commonwealth Fund. https://www.commonwealthfund.org/publications/explainer/2026/feb/why-rural-hospitals-face-funding-crisis-how-it-could-get-worse.

[50] National Indian Council on Aging Wellness. (n.d.). *Funding LTSS in your Community*. https://nicoacompass.org/tribal-leader-resources/funding-coc-in-your-community/.

**Challenge – Outdated technology and underinvestment in telecommunications, broadband, and power grids that keep rural and Tribal communities connected and safe:** Outdated or absent telecommunications and broadband infrastructure have left rural and Tribal communities without internet and modern telecommunication access, limiting business, economic mobility, and emergency and disaster response.

## Policy Options:

- Support and extend funding for the National Telecommunications and Information Administration's (NTIA) Tribal Broadband Connectivity Program (TBCP) and Broadband Equity, Access, and Deployment (BEAD) Program, and the USDA ReConnect Program until the broadband gap is closed.
- Offer flexible grants to rural, persistent poverty, and Tribal communities to build out fiber, fixed wireless, and 5G networks, and as part of those grants, allow additional technical assistance and capacity building to rural and Tribal communities and the residents living in those communities.
- Subsidize public Wi-Fi access for community anchor institutions such as libraries, schools, and healthcare facilities, educational development programs, and workforce development initiatives, specifically those that offer local workforce training.
- Prioritize municipally and Tribal-owned internet service providers or partnerships with trusted, local entities and providers.

## Policy Context:

Today, 95% of American businesses report relying on broadband for basic operations and a primary function of their business.[51] The Federal Communications Commission (FCC) reports almost 28% of rural Americans and more than 23% of people living on Tribal lands lack access to high-speed fixed broadband.[52] The BEAD Program, passed under the IIJA, committed $42.45 billion to close the broadband gap.[53] USDA RD also maintains the ReConnect program to provide loans and grants to extend broadband access to rural and Tribal communities.[54] Unfortunately, even with all the federal government programs dedicated to closing the digital divide, the United States needs an additional $120–$200 billion to ensure every American has access to broadband and telecommunications.[55] Further, an intentional effort must be made to offer the technical assistance, training, and education needed to adopt and implement telecommunications and broadband in rural and Tribal communities to ensure utility.

[51] NCTA – The Internet & Television Association. (2025). *Open Access, Broad Impact: Wi-Fi Fuels America's Small Businesses.* https://www.ncta.com/news/open-access-broad-impact-wi-fi-fuels-americas-small-businesses.

[52] Federal Communications Commission, *2024 Section 706 Report*, FCC 24-27, GN Docket No. 22-270 (March 2024), https://docs.fcc.gov/public/attachments/FCC-24-27A1.pdf.

[53] National Telecommunications and Information Administration, *Broadband Equity, Access, and Deployment (BEAD) Program* (n.d.), https://www.ntia.gov/funding-programs/high-speed-internet-programs/broadband-equity-access-and-deployment-bead-program; *Infrastructure Investment and Jobs Act*, Public Law 117-58 (November 2021), https://www.congress.gov/bill/117th-congress/house-bill/3684.

[54] U.S. Department of Agriculture, *ReConnect Loan and Grant Program* (n.d.), https://www.usda.gov/reconnect.

[55] Vo, B. (2024). *Five Reasons BEAD Alone won't deliver internet for all.* Connect Humanity. https://connecthumanity.fund/five-reasons-bead-alone-wont-deliver-internet-for-all/.

BENCHMARK #2.2:

# Federal agencies coordinate across programs designated for rural and Tribal communities.

**RURAL AND TRIBAL COMMUNITIES – AND THE PEOPLE LIVING IN THEM – REQUIRE PLACES TO LIVE, EAT, DRINK, WORK, CONVENE, RECEIVE CARE, AND CELEBRATE.** While the United States' federal rural development programs support all these functions, they are uncoordinated at best. The lack of a holistic development approach limits the federal government's ability to support thriving rural and Tribal communities. This section provides policy options for three key challenges:

1. Lack of a clear rural and Tribal economic development department, agency, or plan
2. Federal rural policy that is largely housed at USDA, even though agriculture represents only a small share of today's rural economy
3. Federal bureaucracy that complicates communication across rural and Tribal programs



**Challenge – Lack of a clear rural and Tribal economic development department, agency, or plan:** The federal government does not have a cohesive, holistic, rural and Tribal development approach, limiting its ability to coordinate and simultaneously causing redundant, duplicative, and disjointed efforts.

## Policy Options:

- **CREATE A RURAL DEVELOPMENT-SPECIFIC EFFORT THAT IS STATUTORILY MANDATED TO COORDINATE ACROSS HUNDREDS OF RURAL FEDERAL PROGRAMS.**
- **CREATE A TRIBAL DEVELOPMENT-SPECIFIC EFFORT THAT IS STATUTORILY MANDATED TO COORDINATE ACROSS THE HUNDREDS OF TRIBAL AND NATIVE FEDERAL PROGRAMS.**
- Statutorily authorize USDA RD as an independent agency for Rural Development and make the head of it a Senate-confirmed Administrator.
- Create a career civil service role of White House Rural and Tribal Liaison that remains beyond political terms.
- Direct funding to the White House Council on Native American Affairs (WHCNAA) and formalize the inclusion of representatives from Tribal Nations.

## Policy Context:

Across the federal government, there are over 400 programs dedicated to economic development for rural communities, spanning 13 departments, 10 independent agencies, and over 50 offices and sub-agencies.[56] Yet, these programs are not part of a writ large federal rural development strategy. Additionally, 14 separate legislative committees in Congress maintain jurisdiction over authorizing legislation for rural-eligible development programs.[57] While USDA RD, the Council on Rural Community Innovation and Economic Development, and the National Rural Development Coordinating Committee (NDRCC) are directed to coordinate federal rural policy, the cumulative federal programming goes beyond their purviews and directives. **WITHOUT A HOLISTIC AND INTENTIONAL CROSS-GOVERNMENT APPROACH TO RURAL POLICY, FEDERAL PROGRAMS WILL CONTINUE TO BE DUPLICATIVE, REDUNDANT, AND FRAGMENTED AND WILL CONTINUE TO HINDER ECONOMIC PRODUCTION IN RURAL COMMUNITIES.**

Many foreign nations have whole-of-government departments and agencies dedicated to holistic development approaches, including nations with significant rural and Indigenous populations such as India, Australia, and New Zealand. These examples can provide different types of approaches to steering, coordinating, and directing a holistic, full-government development effort for rural and Tribal communities.

Finding opportunities to uplift rural and Tribal causes at the White House in both political and civil service roles allows for continued attention beyond presidential terms. The WHCNAA was established in 2013 to improve the coordination of federal programs and resources in consultation with Tribal communities. Because the Council does not have a permanent statutory authority and dedicated funds, continuity and staffing have remained challenges.

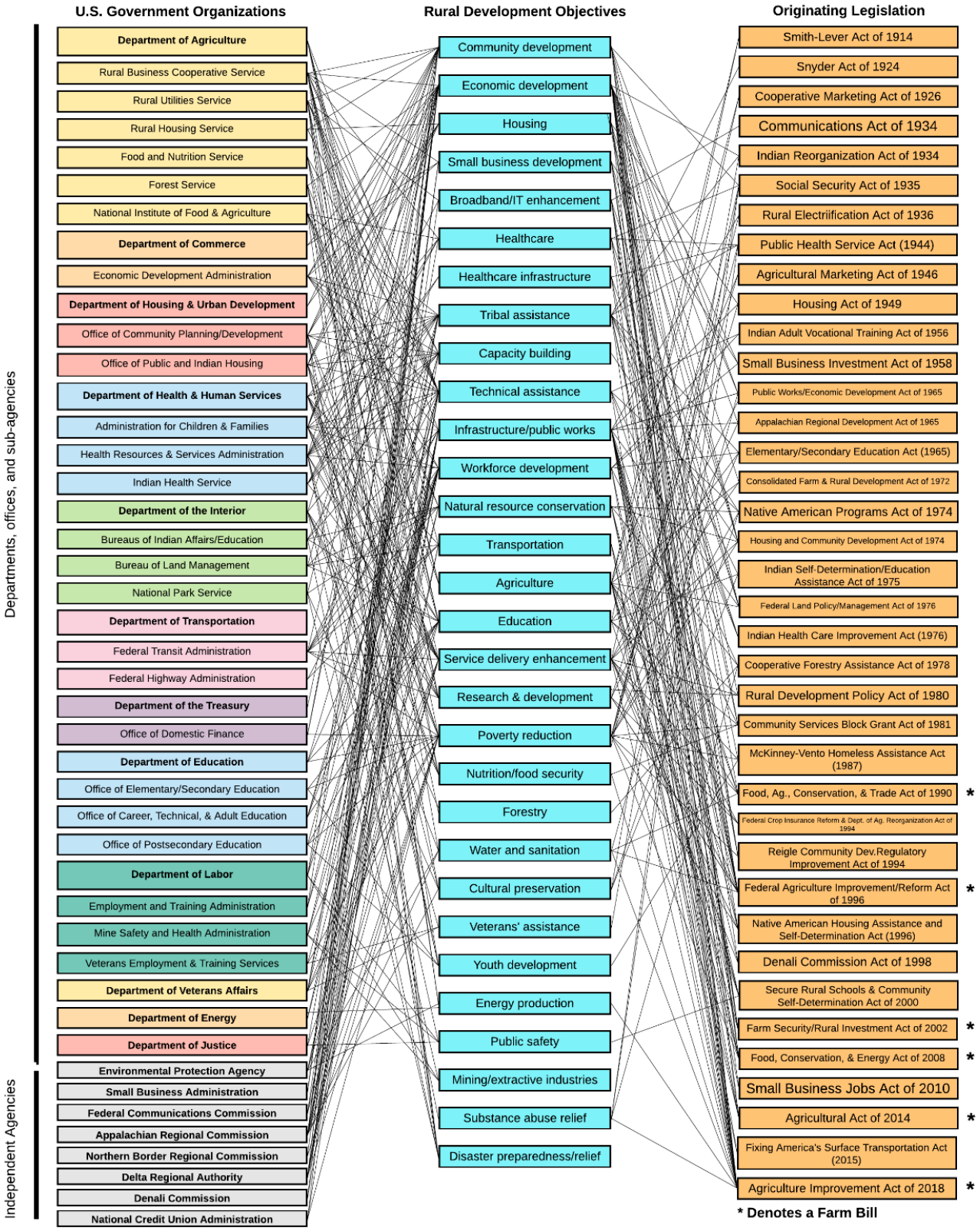



[56] Pipa, A. & Geismar, N. (2020). *Reimagining rural policy: Organizing federal assistance to maximize rural prosperity.* Brookings.https://www.brookings.edu/articles/reimagining-rural-policy-organizing-federal-assistance-to-maximize-rural-prosperity/.

[57] Pipa, A. & Geismar, N. (2020). *Reimagining rural policy: Organizing federal assistance to maximize rural prosperity.* Brookings.https://www.brookings.edu/articles/reimagining-rural-policy-organizing-federal-assistance-to-maximize-rural-prosperity/.

# Federal Development Assistance for Rural and Tribal Communities

While USDA is technically charged with directing federal rural policy, programs that promote rural and tribal development are spread widely throughout the government. No comprehensive and integrated strategy exists. As shown below, the array of legislation, directives, and programs meant to help these communities leads to significant confusion and fragmentation.




Source: Pipa, A. & Geismar, N. (2020). *Reimagining rural policy: Organizing federal assistance to maximize rural prosperity.* Brookings.

## Challenge – Federal rural policy that is largely housed at USDA, even though agriculture represents only a small share of today's rural economy:

The federal government directs USDA RD to coordinate federal policy around rural development without offering the political focus and coordination needed across the federal government.

### Policy Options:

- Statutorily establish and fund the USDA RD Rural Partners Network (RPN).
- Direct USDA RD to produce an annual report on its coordination efforts, successes, and impact, as well as proposed improvements and shortfalls.
- Mandate USDA RD and other federal departments and agencies to track and publish demographic data of programmatic dollar recipients and require a thorough review of the capital distributions to identify geographic and population funding gaps.

### Policy Context:

The RPN was an informal effort established in 2022, connecting 16 federal agencies and commissions to support economic growth in rural communities.[58] While the effort received some funding from Congress, it was never statutorily authorized and has since ended due to shifts in policy priorities. USDA RD's appropriations often revolve around loans and grants subject to broader agricultural efforts and account for only 5%–10% of USDA's total budget.[59] USDA's mandate is for agricultural output; therefore, the focus of funding is unevenly weighted and distributed toward agriculture-specific regions. This leaves less economic capital opportunities for more remote, vulnerable, persistent poverty communities, especially those that are less reliant on agriculture as a share of their economy, as well as Tribal Nations. Aside from direct funding from USDA, grantmaking organizations can offer financial support utilizing federal funds. But those funds only reach the communities that need them if they are well-organized and supported. Yet, between 2014 and 2021, the rural south had fewer grantmaking organizations and less grantmaking activity than any other region.[60] It is imperative that USDA and all federal departments offering rural and Tribal development programs do thorough reviews of program impact across demographics. There are several examples of initiatives that seek to identify and minimize the disparity of federal resources going to rural and Tribal communities, including the work of the USDA Equity Commission, the Economic Development Administration's (EDA) efforts to strengthen equitable economic development strategies nationwide, BIA's Progress Report for Tribal Nations tracking funding across departments, and the Office of Management and Budget's (OMB) budget report. However, more intentional, cross-cutting efforts are sorely needed.

## Challenge – Federal bureaucracy that complicates communication across rural and Tribal programs:

Even when coordinated, federal rural and Tribal development offices overseeing programs are often located far from where the work is being implemented. This creates red tape and significant time delays that hinder departmental and agency work.

### Policy Options:

- Direct and fund USDA RD to maintain an interagency directory of all federal and state programmatic offices operating rural economic development initiatives.
- Direct and fund BIA to maintain an interagency directory of all federal programmatic offices implementing Tribal economic development programming.
- **CREATE TWO ONE-STOP CUSTOMER SERVICE OFFICES FOR RURAL AND TRIBAL COMMUNITIES, RESPECTIVELY, TO ASSIST APPLICANTS WITH FINDING, CONNECTING WITH, APPLYING FOR, AND UTILIZING FEDERAL PROGRAMS FOR WHICH THEY ARE ELIGIBLE.**
- Ensure all technologies within federal offices and programs operating rural and Tribal development efforts meet 21st century needs.

### Policy Context:

Several federal agencies implement regional and state rural and Tribal development work, including USDA RD, BLM, BIA, and HUD. Of USDA RD's total workforce, 90% are on-the-ground program or field staff,[61] and 90%–95% of the BIA and the Bureau of Indian Education (BIE) workforce are located in the states, on or near the Tribal lands they serve.[62] **CURRENTLY, THERE IS NO SHARED FEDERAL DIRECTORY OR MECHANISM ENABLING LOCALLY BASED STAFF ACROSS FEDERAL DEPARTMENTS AND AGENCIES TO COORDINATE AND SHARE RESOURCES IN REAL TIME. SUCH A DIRECTORY OR MECHANISM WILL NOT ONLY SAVE TIME AND FEDERAL FUNDING, BUT MORE IMPORTANTLY, PRODUCE BETTER OUTCOMES AND GENERATE GREATER IMPACT FOR THESE COMMUNITIES.**

[58] United States Department of Agriculture, Rural Development. (2022, April). Rural Partners Network: Building Stronger Futures Together. https://www.rd.usda.gov/sites/default/files/508_RD_FS_RuralPartnersNetwork_041822.pdf.

[59] United States Department of Agriculture. (2026). *Spending Profile*. http://usaspending.gov/agency/department-of-agriculture.

[60] United States Department of Agriculture Rural Development Innovation Center. (n.d.). *The Geography of Rural America's Philanthropic Sector*. https://storymaps.arcgis.com/stories/d498f6bbff054f26b1d94d556832bd27.

[61] United States Department of Agriculture Rural Development. (n.d.). *Offices*. https://www.rd.usda.gov/about-rd/offices.

[62] Bureau of Indian Affairs. (n.d.). *Frequently Asked Questions*. https://www.bia.gov/frequently-asked-questions.

BENCHMARK #2.3:

# Rural and Tribal communities can access economic opportunities with strong capacity-building and technical assistance programming.

**RURAL AND TRIBAL COMMUNITIES FACE UNIQUE CAPACITY ISSUES COMPARED TO THEIR URBAN AND SUBURBAN COUNTERPARTS.** Staffing shortages, volunteer local officials, and limited tax bases leave many communities without the capacity to access and implement federal programs. Capacity building and technical assistance are critical to economic development in rural and Tribal communities. This section provides policy options for three key challenges:

1. Limited local capacity that delays implementation and reduces access to rural and Tribal development programs
2. Insufficient public and private infrastructure and upfront capital to enable projects to take off in rural and Tribal communities
3. Inconsistent definitions of *rural*, *Tribal*, and *persistent poverty communities* that result in fragmented and unreliable data and eligibility for programs



## Challenge – Limited local capacity that delays implementation and reduces access to rural and Tribal development programs:

Applying for federal funding is time-consuming and complex. Because fewer people live in rural and Tribal communities, there are fewer workers to apply for and implement federal funding.

### Policy Options:

- **ADOPT A UNIVERSAL FEDERAL PROGRAM APPLICATION THAT CAPTURES ALL BASIC COMMUNITY DATA NEEDED FOR ALL RURAL AND TRIBAL DEVELOPMENT PROGRAMMING ACROSS THE FEDERAL GOVERNMENT.**
- Offer financial incentives to public and private secondary education institutions, career training centers, and union apprenticeship facilities and programs that meet thresholds for enrollment of American Indian and Alaskan Native communities and participants.
- Offer tax credits and loan repayment to students and professionals who complete workforce training and a specified number of years of service in needed fields such as healthcare, education, construction, agriculture, energy, disaster and emergency response, and childcare support in rural and Tribal communities, and support pipeline programs to remain and practice in those areas.

### Policy Context:

Remote locations, distance, and underinvestment in workforce programs have caused a human capital flight from rural, persistent poverty, and Tribal communities. When the federal government designates rural and Tribal communities to receive capital for development of large-scale infrastructure, economic development, and disaster response initiatives, many of those federal programs require a large skills-based workforce that communities may not have, slowing or halting the completion of the project.

One opportunity to make this process more efficient and effective is to have a universal federal program application, which will save thousands of hours of work for already understaffed and under-resourced communities. With this time savings, communities can apply for more programs, creating additional positive impact.

Offering tax incentives to organizations that provide workforce and skills-based training will support the general ecosystem for communities that hope to receive federal large-scale infrastructure projects. Additionally, offering loan repayment to students and professionals that complete workforce training and a certain number of years of service in needed fields in rural and Tribal will support and continue to retain a strong workforce.

## Challenge – Insufficient public and private infrastructure and upfront capital to enable projects to take off in rural and Tribal communities:

Many communities do not have the upfront capital to apply to the programs meant to support them.

### Policy Options:

- Apply the 10-20-30 formula to all federal programs for rural, Tribal, distressed, and economically vulnerable communities.
- Require all federal departments and agencies with rural and Tribal development programming to forgo upfront match requirements for rural, Tribal, persistent poverty, economically distressed, and economically vulnerable communities.
- Require all federal departments and agencies with rural and Tribal development programming to forgo interest returns on loan repayment capital programs and transition key programs to grant programs.
- Offer tax credits to charitable organizations and private entities that offer upfront capital to support infrastructure and capital investments in rural, persistent poverty, and Tribal communities.

### Policy Context:

**FEDERAL MATCH AND UPFRONT CAPITAL REQUIREMENTS OFTEN UNINTENTIONALLY EXCLUDE RURAL, PERSISTENT POVERTY, AND TRIBAL COMMUNITIES FROM LARGE-SCALE INFRASTRUCTURE GRANTS.** Many federal programs require fixed-percentage matches that disproportionately burden low-capacity tax bases. Between 60%–95% of federal infrastructure and resilience grants require or prefer local cost shares, such as upfront match programs, and yet, 72% of rural communities lack the fiscal capacity to fulfill these mandatory matches.[63] The U.S. Government Accountability Office (GAO) reports that communities unable to meet nonfederal cost-share requirements may forgo federal assistance opportunities, including hazard mitigation grants.[64]

Persistent poverty counties acutely experience the adverse circumstances of a declining tax base and are most burdened by the lack of resources to apply for and access federal

[63] Bureau of Indian Affairs. (n.d.). *Frequently Asked Questions*. https://www.bia.gov/frequently-asked-questions.

[64] U.S. Government Accountability Office, *Disaster Recovery: Use of HUD Block Grant Funds to Meet Cost-Share Requirements*, GAO-25-107603 (2025), https://www.gao.gov/products/gao-25-107603.

resources. The 10-20-30 formula is an anti-poverty provision that calls for at least 10% of federal program and loan funds to go to persistent poverty counties, where at least 20% of the population has lived below the federal poverty line for 30 years. Although the six persistent poverty regions – Appalachia, Native American lands, the Deep South, the Mississippi Delta, the Rio Grande Valley, and the rural West – have benefitted from this provision, other adjacent rural counties and Native communities that are just above the persistent poverty threshold but face similar barriers are often unable to access federal programs.

One federal program that waived or reduced the upfront costs for rural and Tribal communities was the Building Resilient Infrastructure and Communities (BRIC) program, which delivered 67% of its final funding cycle's benefits to underserved communities in its Fiscal Year (FY) 2023 cycle.[65] Replicating this strategy, offering other incentives for philanthropic organizations to provide upfront capital, and allowing other flexible requirements, such as repaying upfront costs over time, will allow more rural and Tribal communities – especially low-income communities – to access federal economic development capital programs.

**Challenge – Inconsistent definitions of *rural*, *Tribal*, and *persistent poverty communities* that result in fragmented and unreliable data and eligibility for programs:** The definitions of *rural*, *persistent poverty*, and *Tribal communities* vary in significant ways across the federal government. The resulting impact means some communities are eligible for some federal programs and not others, compounding an already honeycombed and disjointed rural and Tribal development system.

## Policy Options:

- Establish a statutory baseline for the definitions of *rural, persistent poverty, economically distressed*, and *economically vulnerable,* and require all federal departments, agencies, offices, and teams to apply such definitions to their own programs and calculate and track their data and reporting accordingly.
- Consult with Tribal Nations on standardizing federal Tribal definitions and eligibility.
- Update federal reporting trackers and data systems for federal programs directed to support rural and Tribal development.
- Require all federal departments and agencies to share data as appropriate regarding rural and Tribal communities without violating Indigenous Data Sovereignty.
- Implement a Tribal data access policy and a Tribal health data improvement plan to allow the federal government to fulfill Tribal data requests and ensure Tribal Nations receive critical information during national crises such as pandemics and climate disasters.

## Policy Context:

All federal grants must comply with OMB's Uniform Guidance (found in *2 CFR Part 200*), which creates a baseline for the management of funds, procurements, and audits. However, this is where uniformity stops. Departments and agencies look to standards, income, capital-on-hand, population, and their own definitions of *rural, suburban, and urban*. The federal government does not have a single, government-wide reporting requirement; rather each agency creates its own.

Many federal departments and agencies look to the U.S. Census Bureau, thereby defining *rural* simply by population, housing, or territory located outside of urban areas. This approach is inconsistent with OMB, which characterizes counties as metropolitan or micropolitan/nonmetropolitan, which is still different than USDA RD which uses population thresholds of only 10,000 to 20,000 to define rural communities.

When federal agencies rely on Census data instead of sovereign recognition, decisions on where and how to deploy federal funding become more complicated and potentially exclude areas of critical need. When every federal department and agency is calculating and measuring eligibility for sovereign Tribal Nations, communities, and populations differently, it creates a siloed and disconnected approach to the economic development of those communities. Consulting with Tribal Nations to standardize eligibility and access across federal programs will support rural and Tribal communities in applying for and accessing programs through a more comprehensive application process.

[65] BRIC offered an increased federal cost share, up to 90% federal/10% local instead of the standard 75/25, for "economically disadvantaged rural communities" (populations of 3,000 or fewer with per capita income at or below 80% of the national average), plus a Tribal set-aside and non-financial Direct Technical Assistance for low-capacity applicants. Congressional Research Service, *FEMA's Building Resilient Infrastructure and Communities (BRIC): Recent Developments* (2026), https://www.congress.gov/crs-product/IN12609.

BENCHMARK #2.4:

# Outdoor access, recreation, and tourism provide economic opportunity without exacerbating persistent issues plaguing rural and Tribal communities.



**THE OUTDOOR ECONOMY DEMONSTRATES THAT ECONOMIC GROWTH AND ENVIRONMENTAL STEWARDSHIP ARE NOT MUTUALLY EXCLUSIVE GOALS BUT RATHER DEPEND DIRECTLY ON EACH OTHER.** Investing in infrastructure, workforce, land, water, and cultural preservation creates economic opportunities for rural and Tribal communities. Visitors generate critical economic activity for these communities, supporting local businesses, diversifying economies, attracting investment, and creating jobs, but their success depends on the preservation, conservation, and care for these precious resources. The danger, however, is that these communities simultaneously face affordability challenges, including housing shortages, aging infrastructure, and seasonal employment, with a changing climate placing even further stress on the local economy. Long-term success is defined by the ability to continue to welcome visitors while local families can afford to live, businesses can grow, and the natural and cultural resources are protected for generations to come. This section provides policy options for five key challenges:

1. Outdated infrastructure and public utilities that constrain workforce and tourism growth
2. Seasonal, low-wage, and investor-friendly, rather than worker-friendly, jobs hinder sustainable economic growth
3. Lack of localized capacity for emergency services in low-density rural areas
4. Underinvestment in Tribal and public lands and inadequate engagement of Tribal communities that has damaged sacred sites and natural resources
5. Bureaucratic forces hinder sustainable and culturally appropriate economic opportunities on lands managed by the federal government



**Challenge – Outdated infrastructure and public utilities that constrain workforce and tourism growth:** While outdoor access, recreation, and tourism can be economic drivers for many rural and Tribal communities, a lack of, underinvestment in, and burden on, outdated infrastructure can makes it difficult for these communities to foster sustainable economic opportunities.

## Policy Options:

- Provide additional funding for the Legacy Restoration Fund and Tribal Infrastructure Grants.
- Establish a National Outdoor Opportunity Fund and expand funding for the Outdoor Recreation Legacy Partnership (ORLP) program.
- Expand conservation funding through the Land and Water Conservation Fund (LWCF) and continue to increase funding for agencies like BLM and the U.S. Forest Service (USFS), particularly for maintenance and upgrades.
- Support offices or agencies focused on outdoor recreation; partner with states, Tribes, local governments, businesses, and conservation leads to expand sustainable recreation opportunities on protected lands and waters; and help communities benefit from these natural assets.

## Policy Context:

Protecting and conserving America's lands, water sources, parks, and recreation areas will ensure they are available for generations to come. Essential programs like the Legacy Restoration Fund and grants for Tribal infrastructure will ensure public access to these sites. Further, establishing a National Outdoor Opportunity Fund as a congressionally chartered foundation to provide long-term grants for outdoor programs for underserved youth will support future generations that appreciate the nation's lands and resources. Expanding outdoor recreation directly supports local communities, increases the health and well-being of community members, and spurs local economies. Funding staff across federal agencies and departments working on outdoor recreation initiatives will help with coordination, collaboration, and integration with Tribal Nations to steward the land, which is imperative to the success of these programs. Additionally, 25 states have created state-level officers of outdoor recreation. Efforts to partner with and support these offices will pay dividends for outdoor access.[67]

**Challenge – Seasonal, low-wage, and investor-friendly, rather than worker-friendly, jobs hinder sustainable economic growth:** Outdoor recreation and tourism often rely on volatile, seasonal employment, as well as a workforce that lives in the area only during the working season. This can cause extreme local housing shortages and extraction of capital, leaving rural communities displaced and without work.

## Policy Options:

- Where applicable, require outdoor recreation and seasonal services on federal lands or utilizing federal funding to hire local residents for at least 25% of jobs before accepting external applicants.
- Offer tax incentives to small businesses that extend employment beyond typical surge seasons to year-round.
- Require all outdoor federal programs that offer small business loans and programmatic support to require Tribal consultation and include Tribal communities in decision-making processes, including the cultural and traditional knowledge aspects of economic opportunities.

## Policy Context:

Seasonal employees are often priced out of local markets due to vacation rentals and soaring real estate prices, particularly in areas with popular tourist attractions, such as near National Parks. This results in lost job applicants and a struggle to maintain essential visitor and conservation services and key operational hours.[68] Federal agencies can do more to retain seasonal workers. Employee benefits, including healthcare, completion bonuses, return-to-work stipends, expedited rehiring, and guaranteed interview opportunities for future positions, will attract and retain employees. Reduced hours, project-based work, or intermittent shifts during slower seasons will help workers stay connected to their jobs year-round. Maintaining a small core of permanent employees will create year-round employment opportunities while a flexible seasonal workforce provides support and surge capacity during peak periods. Training, certifications, and cross-training opportunities during off-seasons will help workers build skills while encouraging them to return each year.

[67] Outdoor Recreation Roundtable Association. (2025). *State Offices of Outdoor Recreation*. https://recreationroundtable.org/programs/state-level-work/.

[68] Carrier, N. (2024). *Addressing the Housing Crunch in Seasonal Destinations*. Housing Solutions Lab. https://www.localhousingsolutions.org/addressing-the-housing-crunch-in-seasonal-destinations/.

**Challenge – Lack of localized capacity for emergency services in low-density rural areas:** Rural and Tribal communities face severe emergency response deficits. While this is a problem year-round, it is exacerbated during high-tourist seasons when significant populations arrive in rural and Tribal communities and need emergency services.

## Policy Options:

- Reauthorize the *Supporting and Improving Rural EMS Needs (SIREN) Act* and fund authorized programs at higher levels.
- Amend the *Robert T. Stafford Disaster Relief and Emergency Assistance Act* to create an eligibility pathway, limited to rural communities and Tribal Nations, for federal assistance after state-declared and smaller-scale disasters that fall below presidential declaration thresholds. Fund planning grants and technical assistance to help Tribal governments qualify for pre- and post-disaster mitigation funding such as the Hazard Mitigation Grant Program (HMGP) and BRIC.
- Increase funding for programs to expand disaster and emergency response, including the Fire Management Assistance Grants (FMAG) Program and the Rural Emergency Medical Services Training (R-EMS) Program.

## Policy Context:

Due to severe disinvestment, geographic isolation, compounded national emergency response deficits, and often difficult to identify physical addresses in remote and Tribal communities, approximately 82% of rural counties experience ambulance deserts, defined as areas taking more than 25 minutes for EMS to arrive, and 33% of rural EMS agencies are in immediate operational jeopardy.[69] The average 911-to-scene response time in rural areas is over 14 minutes compared to eight minutes in urban settings.[70] Roughly 82% of fire departments are volunteer-based, and rural populations rely heavily on intermittent, unstaffed, and volunteer models. In many Tribal communities, emergency vehicle dispatch may be complicated by jurisdictional boundaries, unknown addresses, and lack of funding, and Tribes often receive a fraction of federal disaster recovery aid – only $3 per capita compared to the national average of $26.[71]

Outdoor recreation and tourism account for a significant percentage of EMS activations, with these activities occurring in more rural, remote, and underfunded places. This paradox escalates during seasonal booms when demand for emergency services spike, but nearly 70% of rural EMS providers struggle to recruit volunteers and must rely on already over committed staff for ambulances and to handle increased call volumes.[72]

This issue is also compounded by the increasingly frequent and severe disasters that affect all regions of the country, including rural and Tribal communities. Preparation for these disasters is critical for when the disaster strikes, as is continual training for emergency response situations. Only 40% of Tribal nations have federally approved hazard mitigation plans, which means preparation for emergency response in the majority of communities is limited.[73] The federal government already commits funds and programs to offer immediate assistance during disasters, but the Disaster Relief Fund has run short every year since 2023. Furthermore, each time the Federal Emergency Management Agency (FEMA) restricts it to lifesaving activity, the recovery and mitigation dollars that rural and Tribal communities depend on, and cannot replace, are the first to pause.[74,75]




[69] King, N., Pigman, M., Huling, S., & Hanson, B. (2019). *EMS Services in Rural America: Challenges and Opportunities.* National Rural Health Association. https://www.ruralhealth.us/getmedia/cc0078fa-14d2-47eb-98a6-2bb6722e540c/2019-NRHA-Policy-Document-EMS-Services-in-Rural-America-Challenges-and-Opportunities.pdf.

[70] King, N., Pigman, M., Huling, S., & Hanson, B. (2019). *EMS Services in Rural America: Challenges and Opportunities.* National Rural Health Association. https://www.ruralhealth.us/getmedia/cc0078fa-14d2-47eb-98a6-2bb6722e540c/2019-NRHA-Policy-Document-EMS-Services-in-Rural-America-Challenges-and-Opportunities.pdf.

[71] King, N., Pigman, M., Huling, S., & Hanson, B. (2019). *EMS Services in Rural America: Challenges and Opportunities.* National Rural Health Association. https://www.ruralhealth.us/getmedia/cc0078fa-14d2-47eb-98a6-2bb6722e540c/2019-NRHA-Policy-Document-EMS-Services-in-Rural-America-Challenges-and-Opportunities.pdf.

[72] Utah Department of Public Safety, Bureau of Emergency Medical Services. (2025, February) *Addressing Critical Issues Affecting Rural EMS Agencies*. https://ems.utah.gov/wp-content/uploads/sites/34/2025/02/Rural_EMS_white_paper_Feb20_2025_website.pdf.

[73] Federal Emergency Management Agency. (2026, July). *Hazard Mitigation Plan Status*. https://www.fema.gov/emergency-managers/risk-management/hazard-mitigation-planning/status.

[74] Congressional Research Service, The Disaster Relief Fund: Overview and Issues (January 2024), https://www.congress.gov/crs-product/R45484; Federal Emergency Management Agency, *FEMA Announces Implementation of Immediate Needs Funding as Disaster Relief Fund Continues to Deplete* (April 2026), https://www.fema.gov/press-release/20260429/fema-announces-implementation-immediate-needs-funding-disaster-relief-fund.

[75] Further discussion on emergency response and disaster preparedness can be found in Chapter 3: Thriving, Affordable, and Resilient Communities.

**Challenge – Underinvestment in Tribal and public lands and inadequate engagement of Tribal communities that has damaged sacred sites and natural resources:** Failure to consult and engage Tribal Nations and communities in planning and decision-making, historical encroachment on Tribal lands and sacred sites, understaffing, and excessive bureaucratic burden and red tape have led to poor management and protection of sacred sites and has damaged Tribal and natural lands.

## Policy Options:

- Provide staffing, training, and strict requirements for federal agencies to ensure proper Tribal consultation, review, and approval of decisions and projects affecting Tribes, and ensure timely approval where appropriate.
- Increase the staff capacity at BIA to support quicker review of infrastructure and economic development projects and funding.
- Require BLM, USDA RD, and other federal rural and Tribal agencies to engage with Tribes early and transparently during project and program development.
- Reauthorize and fund DOI's federal Land Buy-Back Program for Tribal Nations.

## Policy Context:

Each of the 575 federally recognized Tribes in the U.S. operates differently and has their own unique sovereign government and government-to-government relationship with the U.S. These unique relationships require specific federal programs, services, and funding tailored to each Tribe. BIA is a primary source of federal funding and often manages services, approvals, and coordination with Tribes, but hundreds of other individual programs across federal agencies and departments also interact with Tribal Nations. It is critical that all of these agencies have the proper training, staffing, and systems in place to ensure consultation and coordination with Tribes.

Chronic underfunding of BIA and BIE has meant that these agencies have large deferred maintenance backlogs on the order of hundreds of millions of dollars in needed repairs, with BIE funded educational facilities in severe need of modernization and repair.[76] **DUE TO BIA AND OTHER TRIBAL PROGRAMS BEING SIGNIFICANTLY UNDERFUNDED FOR DECADES, APPLICATIONS TO WORK ON TRUST LANDS AND FEDERALLY MANAGED LAND MAY REMAIN UNADDRESSED AND ON LONG WAITLISTS FOR UPWARDS OF FIVE TO TEN YEARS. THIS IS FURTHER COMPLICATED BY FUNDING CYCLES FOR PROGRAMS, AND THE DELAYS CAN GO WELL BEYOND REPORTING DEADLINES AND BASIC FEDERAL AND TRIBAL DEVELOPMENT REQUIREMENTS.** This has become a significant deterrent to potential applicants, leading to ad hoc and under supervised operations; a lack of formal, Tribal consultation and involvement; and significant damage to rural and Tribal communities, sacred sites, and rural, Tribal, and public lands.

The government can reduce these impacts by providing sufficient staffing at BIA, BLM, BIE, and other federal agencies that work with Tribes; requiring federal departments and agencies to engage in Tribal consultation in a timely manner; and transferring clearer legal authority to Tribal Nations and their leadership to make decisions. Additionally, the DOI Land Buy-Back Program for Tribal Nations allowed the federal government to purchase fractional land interests from willing sellers at fair market value, which were then immediately restored to Tribal trust ownership. Critically, the program helped consolidate over two million acres, paying out nearly $2 billion to individual landowners, and allowing for development on those lands to proceed. The program expired in 2022 and should be reauthorized.[77]



[76] Haaland, D. (2024, May). *STATEMENT OF DEB HAALAND SECRETARY U.S. DEPARTMENT OF THE INTERIOR BEFORE THE SUBCOMMITTEE ON INTERIOR, ENVIRONMENT, AND RELATED AGENCIES COMMITTEE ON APPROPRIATIONS UNITED STATES SENATE*. United States Department of the Interior. https://www.doi.gov/ocl/interior-budget-18.

[77] United States Department of the Interior. (n.d.). *Land Buy-Back Program for Tribal Nations*. https://www.doi.gov/buybackprogram/about.



**Challenge – Bureaucratic forces hinder sustainable and culturally appropriate economic opportunities on lands managed by the federal government:** Tribal and federal lands managed by the U.S. federal government face additional bureaucracy, which hinders economic opportunity.

## Policy Options:

- Grant Tribes equal decision-making authority on ancestral land managed by USFS, the National Park Service (NPS), and BLM.
- Simplify and streamline the land-into-trust process and remove obstacles for Tribes working to acquire lands into federal trust.
- Re-instate the *Public Lands Rule* and expand it to the government as a whole.

## Policy Context:

Public lands and waters are managed by a number of agencies resulting in significant red tape. These bureaucratic barriers cost significant time, create additional paperwork, and require additional staff to review and approve decisions, causing significant delays, pauses, and sometimes, full stop of projects that would support rural and Tribal programs and economic opportunities.

Adopted in 2024, the BLM *Public Lands Rule* was designed to clarify that conservation was considered a valid use of public lands, much like extractive practices such as mining or grazing are considered valid uses. This thereby ensured a smoother process to utilize the land according to community wishes and supported their own economic development goals. Crucially, the rule was intended to support restoration of public lands and waters, but was rescinded in May 2026.[78,79] Reinstituting the rule will cut unneeded bureaucracy and reinstate options for community decision-making.

[78] United States Department of the Interior. (2025, September). *Interior Proposes to Rescind Public Lands Rule, Restoring Balanced, Multiple-Use Management*. https://www.doi.gov/pressreleases/interior-proposes-rescind-public-lands-rule-restoring-balanced-multiple-use.

[79] Chapter 4: Safe, Clean, and Prosperous Ecosystems provides additional recommendations on conservation and stewardship practices.

**BENCHMARK #2.5:**

# Direct, flexible capital flows into rural and Tribal communities to support economic development.



**ECONOMIC GROWTH IS MOST OFTEN SPURRED BY DIRECT CAPITAL INVESTMENT.** Flexible capital is the foundational glue for a place-based and holistic development, including in persistent poverty communities approach to rural and Tribal development. Compared to their urban counterparts, rural and Tribal communities only receive about 3% of philanthropic funding, which is incommensurate with their populations and land mass.[80] This section provides policy options for two key challenges:

1. Misaligned and uncoordinated reporting, due diligence, timeline, and closing date requirements
2. The disproportionate impact of capital deserts on rural and Tribal communities



[80] Sablik, T. (2024). *The Philanthropy Gap in Rural America.* Federal Reserve Bank of Richmond. https://www.richmondfed.org/publications/research/econ_focus/2024/q4_feature2.

## Challenge – Misaligned and uncoordinated reporting, due diligence, timeline, and closing date requirements:

Development programs and projects often come with extensive reporting and due diligence requirements, shortened timelines, and closing dates that may be difficult for communities to meet. This may significantly hinders their ability to access the federal dollars meant for them.

### Policy Options:

- Allow for flexible reporting and extended deadlines for Tribal projects on trust lands in coordination with DOI and other agencies.
- Require all federal programs serving these communities to maintain a standard application and streamline reporting to reduce the staff's time to complete required paperwork.
- Remove financial match requirements and caps on use of funds for technical assistance, staff, and capacity building for rural and Tribal development programs to allow communities to use federal dollars for their best use, including in persistent poverty communities.

### Policy Context:

Beyond the federal government's fiscal year, rural and Tribal development programs across federal departments and agencies operate on different application, reporting, and project completion timelines. While this lack of alignment may appear to provide flexibility, in practice it creates significant barriers to implementing complex projects that rely on multiple federal funding sources. Housing development on Tribal trust land illustrates this challenge. These projects often require coordinated funding from water and wastewater infrastructure programs, Community Development Block Grants (CDBG), Tribal housing programs, and other rural development initiatives. When each program operates under different deadlines and performance periods, communities must navigate conflicting requirements while attempting to sequence a single project. These challenges are further compounded by lengthy BIA review and approval processes, including at other federal agencies, making it difficult for communities to align funding timelines and complete projects within each program's required timeframe.

Federal programs offering flexible reporting and completion timelines have allowed rural and Tribal communities to complete infrastructure projects and maximize the federal programs and dollars that they need. Additionally, removing criteria around staffing and technical assistancefor federal grant and loan capital programs allows rural and Tribal communities to maximize the programs with the appropriate staffing necessary. For example, some federal programs have a maximum allowance of 10% or 20% of staff time that can be allocated for technical assistance. This is a hurdle when a small team of one or two people located in the community must use over 50% of their time on technical assistance and capacity building, and is difficult to account for in the reporting process. Ensuring technical assistance and capacity building funds are available and also not restrictive will allow the programs to meet the needs of the local communities. Many of these changes may require legislative action to harmonize programs alongside administrative streamlining to make it as easy as possible for communities to meet multiple and often competing requirements.

## Challenge – The disproportionate impact of capital deserts on rural and Tribal communities:

Capital deserts are geographic areas with a severe shortage of banks, credit unions, and small business lenders. These disproportionately affect rural, low-income, and Tribal communities, constraining their ability to hold and provide capital and keep federal capital through grant and loan programs.

### Policy Options:

- Increase funding and staffing for the Community Development Financial Institutions (CDFI) Fund.
- Create a tiered approach for recertification of organizations as required for eligibility for the CDFI Fund. The timeline for recertification could be tied to years of consecutive certification (e.g., organizations that have been certified for five consecutive years would need to recertify every 2 years; organizations that have been consistently certified for 10 years would need to recertify every 3 years).
- Permit federal award funds to be held at any federally insured depository, including credit unions and depository CDFIs, and encourage states to add these institutions to their public depository lists.
- Consult with Tribes and work with banks to allow lending and mortgages that expand opportunities to buy equipment, inventory, buildings, and other capital investments needed for business development.
- Encourage banks to place a mortgage on a Tribal borrower's interest in a land lease rather than on physical trust land and allow equipment, inventory, or modular buildings purchased with a loan to be used as security and collateral.

- Require banks operating in low-density communities and on Tribal land to dedicate a portion of dividend distributions or available capital to consumer lending in these communities, ensuring local deposits support local access to credit.
- Expand BIA's Indian Loan Guarantee and Insurance Program (ILGP) and HUD's Section 184/Title VI programs.
- Create and fund flexible loan and capital programs across the federal government, beyond the CDFI Fund, that can be utilized and deployed in conjunction with rural and Tribal economic development programs and are only accessible for rural, Tribal, and persistent poverty communities.

## Policy Context:

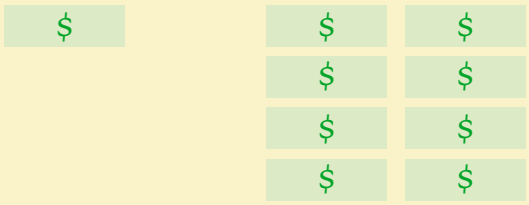
The lack of capital in rural, Tribal, and persistent poverty counties is consistent across all forms of capital. Rural communities receive only approximately 3% of philanthropic giving[81] and 1% of venture capital,[82] and on average, rural loan funds borrow 27% less from banks than urban loan funds.[83] Over the past few decades, larger banks have slowly retreated from rural and Tribal communities. A Federal Reserve study found that between 2012 and 2017, 40% of rural counties, roughly 800 counties, lost more than 1500 local branches.[84] Concurrently, large banks often rely on a methodology that depends on traditional liquid assets such as bonds and cash on hand. Liquid capital assessments may reject providing services in communities that rely on non-traditional assets like specialized agriculture and land, which hinders rural and communities and Tribal Nations from accessing banking services and lending opportunities. Additionally, due to remoteness and the lack of telecommunications and power infrastructure, broader banking access may be inhibited as it is moving to online and mobile banking, increasing the challenges in rural and Tribal communities.

With thousands of rural communities across the U.S. in need of banking services, there is no common algorithm or menu that will solve every community's needs. That said, the common thread across these communities is the need for flexible capital. Unfortunately, access to flexible capital is becoming harder as banks and credit unions leave rural and Tribal communities.

The CDFI Fund is one way the federal government is leveraging public dollars with private capital to lend and support rural and Tribal economic development. For every $1 of public capital, CDFIs leverage an additional $8 of private capital. The CDFI industry manages more than $222 billion in total assets. Many emerging, rural, and Native CDFIs utilize the CDFI Fund Financial Assistance Awards to leverage other private and philanthropic capital.[85] Replicating similar programs within rural and Tribal development programs is a great way to incentivize public and private partnerships. Further, given increasing capital deserts, encouraging and allowing federal funds to be held at any federally insured depository will provide flexibility for recipients to keep and access their funds locally.

In addition to providing capital and loan products responsive to local and regional borrower needs, rural and Native CDFIs build and sustain entire economic ecosystems in communities, not just loans. Because CDFIs are operating in an unconventional lending system by nature, flexible and long-term capital and resource investment are needed to ensure they are able to continue their multiplier effect. Additionally, requiring banks operating in the U.S. to allow Tribal members to borrow on interest rather than on land will unleash thousands of Tribal members into the American capital market. Incentivizing banks to operate in low-density communities and on Tribal land will reduce the number of capital deserts and continue to support rural and Tribal loan programs already offered by the federal government.

The CDFI Fund is one way the federal government is leveraging public dollars with private capital to lend and support rural and Tribal economic development.




**FOR EVERY $1 OF PUBLIC CAPITAL, CDFIs LEVERAGE AN ADDITIONAL $8 OF PRIVATE CAPITAL.**

[81] United States Department of Agriculture Rural Development Innovation Center. (2026, March). *Rural America's Philanthropic Sector: Grantmaking and the Role of Philanthropy in Rural Communities*. https://www.rd.usda.gov/media/file/download/usda-rd-rural-philanthropy-report-03122026.pdf.

[82] Center for Rural Innovation. (2025, May). *New Research Reveals Lack of Capital is Stifling Innovation in Rural America.* https://ruralinnovation.us/press-releases/new-research-reveals-lack-of-capital-is-stifling-innovation-in-rural-america/.

[83] Opportunity Finance Network. (2019, February). *Bank Investment Falls Short in Rural America.* https://cdn.ofn.org/uploads/2022/02/24092655/OPP_054-One-Pager-Handout-CRA_FINAL-Feb-2019.pdf.

[84] Oates, B. & Marema, T. (2020, January). *Loss of Branch Banks Reduces Financial Services for Rural, Report Says.* The Daily Yonder. https://dailyyonder.com/loss-of-branch-banks-reduces-financial-services-for-rural-report-says/2020/01/20/.

[85] Opportunity Finance Network. (n.d.). *U.S. Treasury CDFI Fund*. https://www.ofn.org/us-treasury-cdfi-fund/.



CHAPTER 3:

# Thriving, Affordable, and Resilient Communities

## In every region of the country, the places where people live, work, learn, and raise families are on the front lines of a changing climate.

Communities of every size, income, and geography are grappling with the higher costs of more frequent and severe storms, floods, wildfires, droughts, and heat waves. Insurance premiums are rising and coverage gaps are widening while disaster recovery systems too often arrive late and leave the most vulnerable households behind. Rural and Tribal communities face many of the same hazards as metropolitan areas but with smaller tax bases, fewer staff to pursue and administer federal funds, and longer distances to essential services.[86] Housing and infrastructure are designed for a climate that no longer exists.[87] Consumers bear these costs in higher housing, utility, and transportation bills, lost wages and small-business revenue, displacement from neighborhoods, illness and medical debt, and diminished retirement security. Our response to these pressures will shape household affordability, community stability, health, and national economic competitiveness for decades to come.

Imagine, instead, a future in which federal policy aligns behind the communities Americans want to live in. In this future, families can find safe, energy-smart, healthy, and affordable housing in places served by reliable infrastructure and proximate to good jobs, schools, healthcare, and groceries. Neighborhoods and homes are sited and built to withstand the hazards facing our communities today and into the future, with insurance that remains available and affordable because risk has been measurably reduced. Public infrastructure, including water systems, energy grids, broadband, and emergency communications, is designed for the climate of tomorrow to lower both public costs and private bills. Transportation systems move people and goods affordably, reliably, and safely across surface, maritime, and aviation networks, with a federal floor of access that ensures every household can reach essential destinations regardless of income or zip code.

In this future, land use and development decisions, supported by clear federal signals and modern data, channel growth toward safer, lower-cost places already served by infrastructure, while community-led relocation gives households in the highest-risk locations real, well-resourced pathways forward and prepares receiving communities to welcome them. When disasters do strike, as they undoubtedly will, recovery is fast, consistent, and survivor-centered. One application opens the door to every federal program a household needs, and rebuilding meets modern resilience standards. Accountability rests on whether families are returned to stable housing and economic security, not on how many forms were processed. Public health systems anticipate climate-driven illness, healthcare facilities stay open during extreme events, and family budgets are protected from the rising medical and insurance costs that climate stress would otherwise impose. Insurance and financial systems deliver affordable, reliable protection grounded in honest risk information, and strong consumer protections that ensure that risk-aware markets do not become an instrument of redlining. Federal investment that mobilizes private capital for resilience at the scale the moment demands.

Achieving this vision is well within reach. It requires leadership that consistently centers consumers and affordability, rewards measurable risk reduction, harmonizes fragmented programs around shared outcomes, and equips state, local, Tribal, and territorial partners with the data, financing, and technical capacity to act. It requires treating resilience not as an add-on to existing programs but as the organizing principle of how the federal government invests in housing, infrastructure, transportation, land use, disaster recovery, public health, and financial markets. And it requires steady attention to the households and communities – low- and moderate-income (LMI), rural, Tribal, manufactured-home, renter, and historically underserved – that bear the heaviest costs when these systems fail.

**TO CREATE A THRIVING ECONOMY, THIS CHAPTER FOCUSES ON ACHIEVING THE FOLLOWING BENCHMARKS TO SUPPORT THRIVING COMMUNITIES:**


- **BENCHMARK #3.1:** Communities keep housing affordable and financially stable as risks continue to evolve. | 60
- **BENCHMARK #3.2:** Public infrastructure is built to last and lowers public and private costs. | 65
- **BENCHMARK #3.3:** Transportation systems allow people and goods to move affordably and reliably, now and into the future. | 73
- **BENCHMARK #3.4:** Land use and development decisions reflect current and future risk, guiding growth to safer, more resilient places. | 80
- **BENCHMARK #3.5:** Disaster recovery is fast, community-centered, consistent, and focused on building a better future. | 85
- **BENCHMARK #3.6:** Communities protect health and reduce the growing costs of climate-driven illness. | 92
- **BENCHMARK #3.7:** Insurance and financial systems deliver affordable, reliable protection and long-term stability for households and communities. | 97


[86] Chapter 2: Growing Rural and Tribal Economies provides a deeper treatment of the economic and institutional conditions in rural and Tribal communities and the federal programs that serve them.

[87] Consistent with federal practice, infrastructure in this report includes long-lived physical, digital, and natural systems that are essential to economic activity, national security, public health, and community resilience.

CONGRESSIONAL LEAD:

POLICY EXPERT: SAMANTHA MEDLOCK

# Rep. Kathy Castor

## FL–14



**ACROSS THE UNITED STATES, FAMILIES WANT THE SAME BASIC THINGS: A SAFE AND AFFORDABLE PLACE TO LIVE, LOWER MONTHLY BILLS, AND A COMMUNITY WHERE THEIR CHILDREN CAN BE HEALTHY AND HOPEFUL.** As policymakers, we must help communities plan ahead, lower costs, and build the local resilience that gives families real peace of mind.

This mission is deeply personal to me as Tampa Bay's Congresswoman. After Hurricanes Helene and Milton hit Tampa Bay in 2024, I spent weeks with community leaders and families, seeing firsthand the tragic losses of homes, livelihoods, and property. Floridians are resilient, but the increasing frequency and intensity of climate change-fueled disasters strain local resources, as well as the bank accounts of my neighbors. At the same time, we are confronting the pressures of rising energy bills, soaring housing and insurance costs, and extreme heat and flooding. We urgently need infrastructure and energy solutions that are reliable, affordable, and built to last.

This chapter on thriving communities offers a practical agenda to meet those challenges head-on. It focuses on policies that can help communities become more affordable, resilient, and investment-worthy by aligning federal tools with local leadership – supporting safer housing, smarter infrastructure, lower energy costs, and stronger main streets. These are not abstract ideas; they reflect what communities across the country are asking for and what many local leaders are already proving is possible when Washington becomes a better partner in helping places thrive.

The Thriving Economy Project brings together the partners we need to get this right – local officials, advocates, workers, planners, and policy experts who understand that thriving communities are the foundation of a strong American economy. I am grateful for their leadership and determined to carry this work forward, both for families in my district and for communities nationwide. This chapter provides a roadmap for Congress to lower costs, strengthen resilience, and help every family, in every zip code, share in a healthier and more secure future.

Kathy Castor

**BENCHMARK #3.1:**

# Communities keep housing affordable and financially stable as risks continue to evolve.

**SAFE, STABLE HOUSING IS THE FOUNDATION OF HOUSEHOLD FINANCIAL SECURITY, AND FEDERAL HOUSING POLICY MUST WORK FOR CONSUMERS AS CLIMATE RISKS, INSURANCE COSTS, AND OUTDATED FEDERAL PRACTICES PUSH THAT FOUNDATION OUT OF REACH FOR TOO MANY FAMILIES.** The *21st Century ROAD to Housing Act* expands housing supply, streamlines federal reviews, modernizes manufactured housing, and authorizes the U.S. Department of Housing and Urban Development (HUD) Community Development Block Grant-Disaster Recovery (CDBG-DR) program for three years.[88,89] That law is the foundation this benchmark builds on. What the legislation leaves unmet is the risk dimension, ensuring that the homes America can now build faster are sited, constructed, and insured for the climate they will face, and that the affordability the law advances is not overcome by rising premiums, repetitive losses, and disaster costs. Every recommendation in this chapter works better when safe places build more housing. Yet the affordability crisis and the climate crisis compound each other precisely because the supply shortage is most severe in the lower-risk, infrastructure-served places where growth should happen. The recommendations below address that missing dimension. This section provides policy options for three key challenges:

1. Outdated siting and building practices
2. Households that are trapped in the highest-risk locations
3. Disproportionate costs that burden under-resourced households



[88] 21st Century ROAD to Housing Act, H.R. 6644, 119th Cong. (enrolled June 25, 2026), https://www.govinfo.gov/app/details/BILLS-119hr6644enr.

[89] House Committee on Financial Services. (2026, June). *Section-by-Section: 21st Century ROAD to Housing* Act. https://financialservices.house.gov/uploadedfiles/2026-06-22-_fsc_sxs_-_21st_century_road_housing.pdf.

**Challenge – Outdated siting and building practices:** America's housing stock is increasingly exposed to climate shocks, rising insurance and energy costs, and outdated siting and building practices that together threaten affordability, household financial stability, and the long-term viability of communities. Without stronger federal action to reduce risk, lower operating costs, and steer housing investment away from harm, climate stress will deepen displacement, widen inequities, and erode the supply of safe, affordable homes.

## Policy Options:

- Direct the Federal Emergency Management Agency (FEMA), with the National Institute of Standards and Technology (NIST) and HUD, to identify and publish on each code cycle the provisions of the latest International Codes that demonstrably reduce disaster and outage losses, supported by benefit-cost analysis, and make that hazard-resistant baseline, or a state code of equivalent or greater stringency, the condition of federal assistance, so that federal dollars purchase measurable resilience rather than the full cost of every code change.
- Apply energy code minimums through the existing statutory cost-effectiveness determination process at HUD and U.S. Department of Agriculture (USDA).
- Condition federal housing assistance for new development, redevelopment, and rehabilitation on the integration of forward-looking climate risk data into siting, design, and rehabilitation decisions, and on the use of the hazard-resistant provisions of the latest model building codes.
- Embed code requirements for energy efficiency and resilience across the lending portfolios of government-sponsored enterprises that support housing for homebuyers and rehabilitation, including Fannie Mae, rural housing, and veterans' housing programs.
- Expand and accelerate federal investments in housing retrofits for elevation or relocation in flood zones, wildfire hardening and defensible space, weatherization, and integration of efficient electric equipment, on-site renewables, and storage to support occupant survivability during outages and extreme temperatures.
- Provide federal financial and technical assistance to help states establish and expand programs that leverage insurance savings to finance housing retrofits that meet specific, insurance-linked standards to build resilience and reduce risks in extreme weather and disasters.

## Policy Context:

Housing sits at the intersection of affordability, climate risk, and emissions. Homes built outside modern codes and in high-risk locations are increasingly suffering avoidable losses and higher out-of-pocket costs. The U.S. Government Accountability Office (GAO) found that nationally, average homeowners insurance premiums rose 25% or more (after adjusting for inflation) in disaster-prone southern coastal areas from 2019 through 2024 alone, with insurers, state regulators, and consumer advocates alike identifying home upgrades to disaster-resistant standards the policy option they most strongly support.[90] The U.S. Senate Committee on the Budget's December 2024 staff report warns that climate change is driving insurance non-renewals, thereby eroding home equity, the primary retirement asset for most households, and that central bankers and economists warn more than $1 trillion in coastal real estate risks becoming uninsurable and, therefore, unmortgageable.[91]

**AT THE SAME TIME, FEMA'S BUILDING CODES SAVE STUDY FOUND THAT BUILDINGS CONSTRUCTED TO MODERN MODEL CODES SINCE 2000 HAVE ALREADY PREVENTED AN ESTIMATED $1.6 BILLION IN DISASTER LOSSES EACH YEAR, WITH CUMULATIVE LOSSES AVOIDED PROJECTED TO EXCEED $132 BILLION BY 2040. AN ADDITIONAL $600 BILLION IN LOSSES COULD BE AVOIDED BY 2060 IF ALL NEW CONSTRUCTION COMPLIED WITH CURRENT INTERNATIONAL CODES.[92]**

More than 100,000 homes meet the most widely implemented beyond-code standard for resilience, preventing more than $110 million in storm-related insurance claims and saving policyholders more than $34 million in deductibles.[93] The value to consumers is demonstratable, including for construction meeting the Insurance Institute for Business & Home Safety (IBHS) FORTIFIED designation. The Louisiana Legislative Auditor found that homeowners who upgraded to a FORTIFIED Roof saved a median of $1,250 per year, a 22% reduction in annual premiums. IBHS's post-Hurricane Sally analysis found that FORTIFIED homes suffered at least 55% fewer losses and policyholders paid more than 60% less in deductibles compared to conventionally built homes in the same storm track.[94,95]

Yet code adoption and enforcement remain uneven across jurisdictions. Federal housing programs do not consistently require the use of current risk data, and rehabilitation funds too often rebuild to the last century's risks. **CONDITIONING FEDERAL HOUSING DOLLARS ON FORWARD-LOOKING SITING AND MODERN CODES, INCLUDING FOR NEW BUILDING, REBUILDING, AND RETROFITTING, WILL REDUCE TAXPAYER-FUNDED LOSSES, STABILIZE INSURANCE MARKETS, AND ENSURES THAT CONSUMERS BUYING OR RENTING A FEDERALLY SUPPORTED HOME ARE GETTING LONG-TERM AFFORDABILITY RATHER THAN FUTURE REPAIR BILLS.** Federal investments that protect households from rising disaster, utility, and insurance costs can simultaneously cut pollution, strengthen domestic supply chains, and grow durable construction and trades jobs.

[90] United States Government Accountability Office. (2026, February). *Homeowners Insurance: Premiums Generally Tracked Inflation but Rose More in Disaster-Prone Areas*, GAO-26-107867. https://www.gao.gov/products/gao-26-107867.

[91] United States Senate Budget Committee. (2024, December). *The Climate-Driven Insurance Crisis Is Here — and Getting Worse.* https://s3.documentcloud.org/documents/26217177/senate-the-climate-driven-insurance-crisis-is-here-and-getting-worse.pdf.

[92] United States Federal Emergency Management Agency. (2020, November). *Building Codes Save: A Nationwide Study of Loss Prevention.* https://www.fema.gov/emergency-managers/risk-management/building-science/building-codes-save-study.

[93] Insurance Institute for Business and Home Safety. (2026, May). IBHS FORTIFIED *Program Surpasses 100,000 Designations.* https://ibhs.org/ibhs-news-releases/ibhss-fortified-program-surpasses-100000-designations/.

[94] Louisiana Legislative Auditor. (2024). *Department of Insurance: Louisiana Fortify Homes Program.* https://lla.la.gov/.

[95] Insurance Institute for Business and Home Safety. (2022). *FORTIFIED Home™ Reduces Hurricane Sally Damage.* https://ibhs.org/research/fortified-home-reduces-hurricane-sally-damage/.

## Challenge – Households that are trapped in the highest-risk locations:

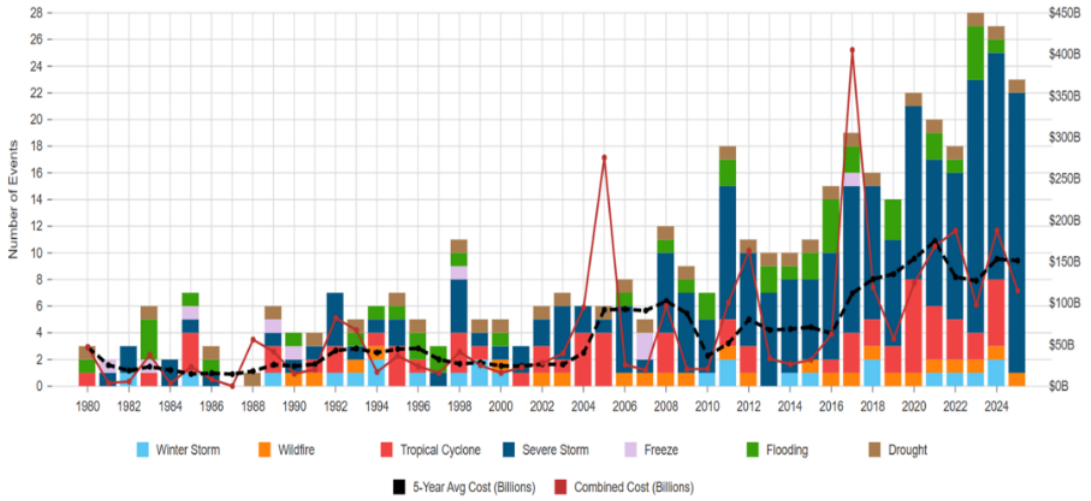
Climate-driven disaster losses, repetitive damages, and rising insurance and utility costs are outpacing housing markets, household budgets, and the federal programs meant to support buyouts and relocation. This leaves consumers in the highest-risk areas trapped in homes that are losing value and becoming unaffordable to insure or maintain. Federal policy currently offers households and communities few coordinated, well-funded options to plan and execute a voluntary, pre-disaster move to safer ground.

## Policy Options:

- Establish a coordinated federal climate-migration framework, anchored by a designated lead agency and a permanent community-led relocation program, to:
  - Provide households and communities in the highest-risk areas with clear, consumer-friendly pathways to plan and voluntarily relocate before, not only after, disasters strike.
  - Expand and align existing buyout, acquisition, and elevation programs –including FEMA Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance (FMA), and HUD CDBG-DR and Community Development Block Grant-Mitigation (CDBG–MIT) – so that households receive timely, fair-market offers (with pre-disaster valuations and other means-tested incentives, where appropriate), full relocation cost assistance, and continued housing-counseling and legal support throughout the move.
- Reduce barriers to the planned transition from areas of greatest risk to safer areas by deploying federal funding and technical assistance to:
  - Support origin communities in planning for property conversion to open space, restoration, or risk-reducing uses.
  - Prioritize owners and occupants of repetitive-loss properties, LMI households, renters, Tribal communities, and historically underserved communities.
  - Support economic development in designated receiving communities and help them expand affordable housing supply, resilient infrastructure, schools, and essential services in lower risk areas, with designation and funding conditioned on zoning and sufficient permitting capacity to absorb new households.
- Standardize federal data, risk disclosures, and a single point of entry for buyout and relocation program applicants to reduce administrative burden.

## Policy Context:

The growth of climate risk is now outpacing the housing market's ability to price and absorb it. From 1980 through March 2026, the United States sustained 431 separate billion-dollar weather and climate disasters at a combined cost of more than $3.1 trillion (in Consumer Price Index [CPI]-adjusted to 2026 dollars), with 27 such events occurring in 2024 alone totaling $182.7 billion.[96,97] Repetitive flooding compounds the problem at the household level. A small share of properties drives a disproportionate share of National Flood Insurance Program (NFIP) losses, with repetitive-loss properties historically representing less than 2% of NFIP policies but generating a substantially larger share of claim payments. Approximately one in six dollars of NFIP claims paid over the past three decades goes to buildings with a history of repeated flood damage.[98,99] For affected households, this translates into rising premiums, falling home values, and shrinking equity. The U.S. Department of the Treasury's Federal Insurance



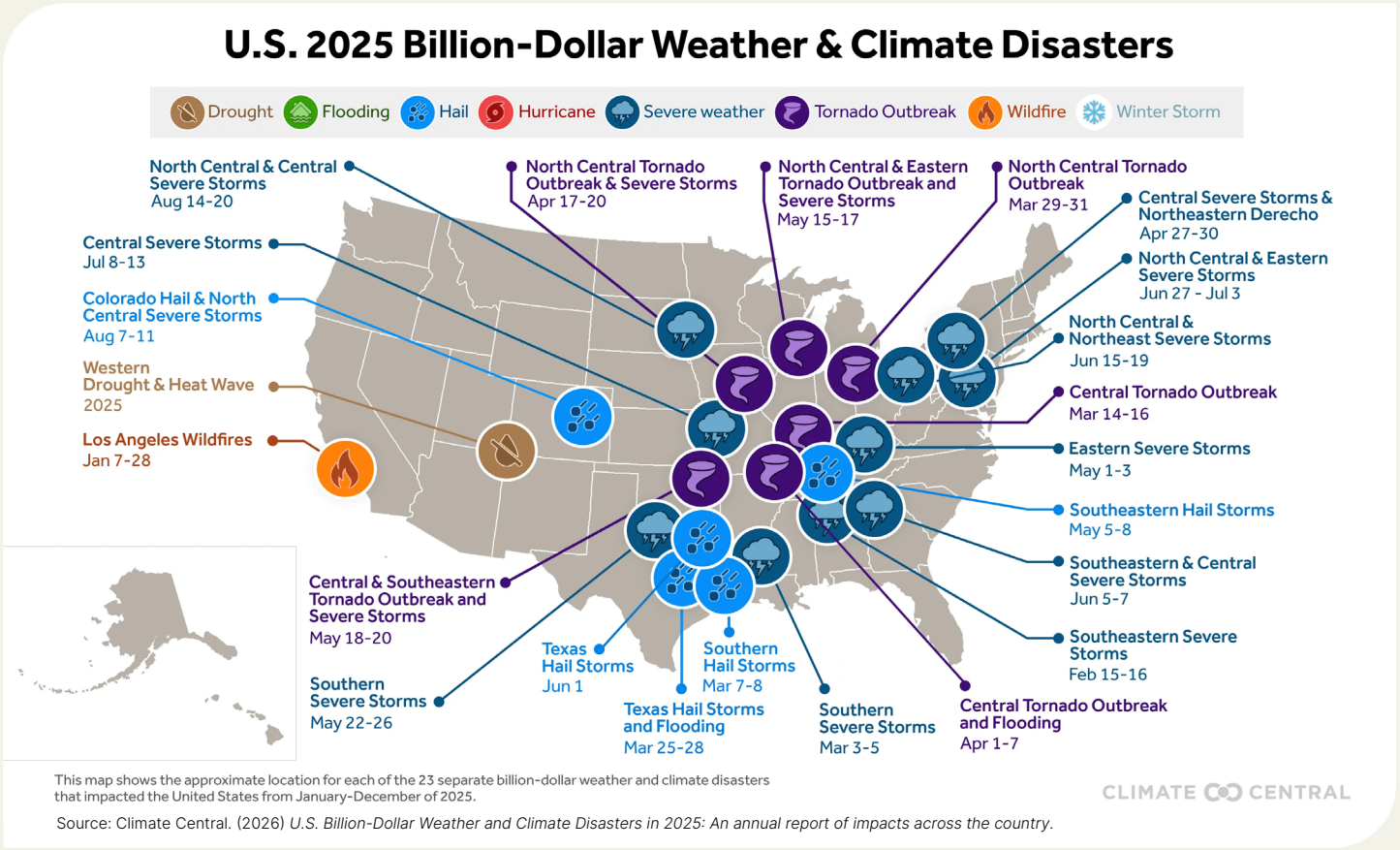

Source: Climate Central. (2026) *U.S. Billion-Dollar Weather and Climate Disasters in 2025: An annual report of impacts across the country.*

[96] Climate Central. (2026) *U.S. Billion-Dollar Weather and Climate Disaster*. https://www.climatecentral.org/climate-services/billion-dollar-disasters.

[97] This dataset was developed and maintained by the National Oceanic and Atmospheric Administration's National Centers for Environmental Information (NOAA NCEI) from 1980 through July 2025, when stewardship transferred to Climate Central, which continues the series under the same methodology and lead scientist.

[98] Federal Emergency Management Agency. (2026, May). *NFIP Multiple Loss Properties Dataset*. https://www.fema.gov/openfema-data-page/nfip-multiple-loss-properties-v1.

[99] Federal Emergency Management Agency. (2022, April). Build Resilience: Add a Repetitive Loss Provision to Local Floodplain Management Regulations. https://www.fema.gov/sites/default/files/documents/fema_repetitive-loss-fact-sheet.pdf.

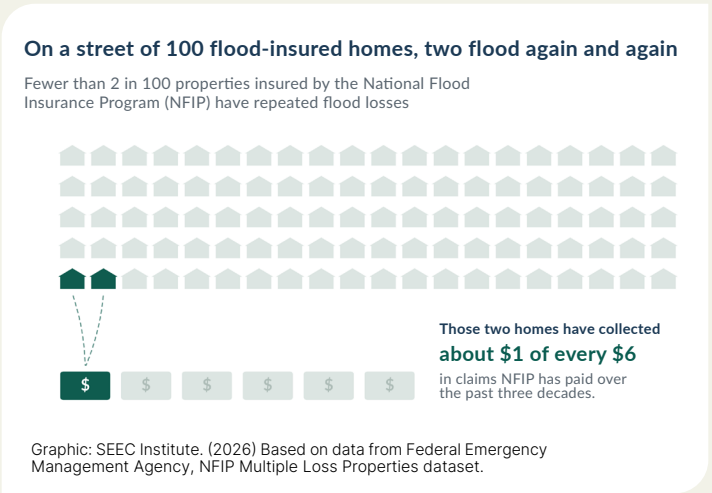



This map shows the approximate location for each of the 23 separate billion-dollar weather and climate disasters that impacted the United States from January-December of 2025.

Source: Climate Central. (2026) *U.S. Billion-Dollar Weather and Climate Disasters in 2025: An annual report of impacts across the country.*

Office (FIO), drawing on data covering more than 246 million homeowners policies from 2018 through 2022, found that homeowners insurance is becoming more costly and harder to procure in climate-exposed regions, with rising non-renewals a leading indicator of broader housing-market and mortgage-market stress.[100] Relocation from the highest-risk places is already underway as households who can are leaving flood- and fire-damaged communities through non-renewals, piecemeal buyouts, and distressed sales in an unmanaged retreat that is borne one family at a time. The choice is not whether Americans will move away from untenable risk, but whether they move through a planned, funded, community-led process or through the chaotic and regressive process already happening.

Yet federal tools to help households move proactively remain fragmented and undersized. GAO found that federal programs are not generally designed to address the scale and complexity of community relocation and that unclear federal leadership is the key challenge to climate migration as a resilience strategy. The absence of a coordinated approach has stretched relocations such as Newtok, Alaska, and Isle de Jean Charles, Louisiana, over 20 to 30 years, resulting in GAO's recommending that Congress establish a climate-migration pilot program with clear federal leadership.[101] When disaster strikes, relocation should not be a privilege of the wealthy or a scheme to deprive marginalized households of generational wealth. Rather, a consumer-centered relocation framework, paired with receiving-community planning and stronger pre-disaster mitigation funding, will give households real options instead of forcing them to wait for the next disaster. Such a framework will reduce repeat federal spending on the same properties, stabilizes insurance and mortgage markets, and creates economic opportunity in safer, well-served places, advancing long-term, sustainable growth that protects consumers and lowers public and private costs. Furthermore, paired investments in resilient infrastructure and local economic development in receiving communities will turn relocation into an engine of housing affordability, regional economic stability, and lower long-term taxpayer disaster exposure.




Graphic: SEEC Institute. (2026) Based on data from Federal Emergency Management Agency, NFIP Multiple Loss Properties dataset.

[100] United States Department of the Treasury, Federal Insurance Office. (2025, January). *Analyses of U.S. Homeowners Insurance Markets, 2018–2022: Climate-Related Risks and Other Factors.* https://climateriskadvisors.com/resources/analyses-us-homeowners-insurance-markets-2018-2022.pdf.

[101] United States Government Accountability Office. (2020, July). *Climate Change: A Climate Migration Pilot Program Could Enhance the Nation's Resilience and Reduce Federal Fiscal Exposure*, GAO-20-488. https://www.gao.gov/products/gao-20-488.

**Challenge – Disproportionate costs that burden under-resourced households:** Low-income households, Black and Latino households, members of Tribal communities, renters, seniors, people with disabilities, children in under-resourced communities, and other vulnerable populations live disproportionately in older, less efficient, and more hazard-exposed housing, and they are least able to absorb rising utility, insurance, and disaster repair costs. Targeted federal investment in resilience and energy retrofits, paired with strong consumer protections, stabilizes household budgets, reduces avoidable costs and human misery, and keeps families safely and affordably housed.

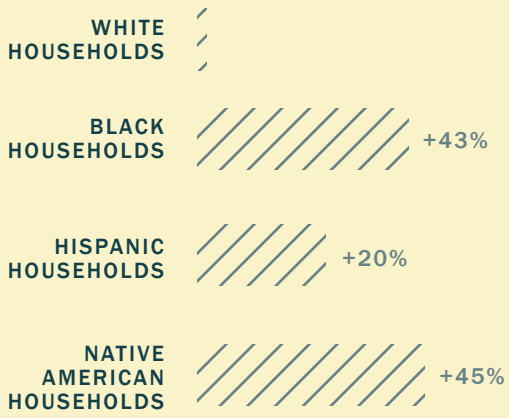
## Policy Options:

- Prioritize federal financial and technical assistance for comprehensive retrofits, bundling weatherization, efficient electrification, distributed solar and storage, flood and wildfire hardening, lead-pipe replacement, and indoor environmental health upgrades, for LMI owners and renters, multifamily and affordable housing, manufactured homes, Tribal housing, and public housing
- Condition federal support for hazard mitigation, energy-efficiency, and clean-energy financing on baseline consumer protections, including:
  - A ban on marketing of financed products to households eligible for zero-cost programs.
  - Independent resilience and energy audits by parties without a stake in the sale.
  - Plain-language disclosures with cancellation rights.
  - Affordability tests that do not rest on unguaranteed savings projections.
  - Public reporting of loan performance and demographic outcome.
  - Truth in Lending-equivalent protections to financing structures.
- Adopt seasonal energy burden as a key targeting metric in programs, require heat- and cold-related moratoria on utility shut-offs, protect renters from displacement and rent spikes tied to retrofits, and pair upgrades with insurance-linked premium credits where mitigation standards are met.
- Expand funding for technical assistance, code-development grants, and targeted incentives to offset incremental construction and retrofit costs for LMI households to lower long-term insurance and energy burdens for consumers and create durable demand for domestic building products and labor. Expand federal support for community-based delivery models, ensuring under-resourced households gain access to trusted assistance, local contractors, and ongoing operations and maintenance support.
- Support state and local workforce development, upskilling, training, and certification for contractors and inspectors to perform IBHS FORTIFIED, home elevations, and other nationally recognized mitigation programs that certify in situ retrofits to avoid work bottlenecks and build strong, well-paying jobs.

## Policy Context:

Utility and insurance costs land unevenly on American households. Compared to white households, Black households spend approximately 43% more of their income on energy, Hispanic households 20% more, and Native American households 45% more, with low-income households paying roughly three times the share of income on energy as non-low-income households.[102] Peer-reviewed analysis built on the U.S. Department of Energy's (DOE) Low-Income Energy Affordability Data found that more than 5.2 million households above the federal poverty line still face energy poverty, disproportionately concentrated in Black, Hispanic, and Native American communities.[103] At the same time, FIO found that homeowners insurance is becoming more costly and harder to procure in climate-exposed regions, driving rising premiums, non-renewals, and growing threats to household wealth and mortgage markets.[104] Targeting federal investments to the households and communities bearing these compounded burdens will lower utility bills, qualify more homes for affordable insurance, reduces disaster recovery costs, and mobilize private capital.

### Utility and insurance costs land unevenly on American households.



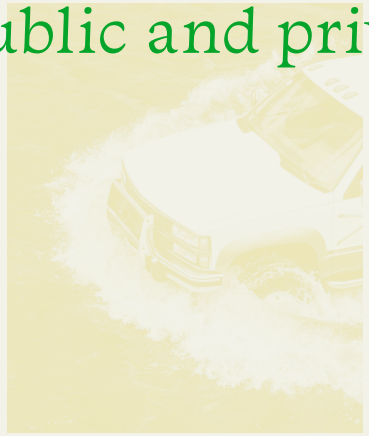

[102] Drehbol, A., Ross, L., & Ayala, R. (2020, September). *How High Are Household Energy Burdens? An Assessment of National and Metropolitan Energy Burden across the United States.* American Council for an Energy-Efficient Economy. https://www.aceee.org/research-report/u2006.

[103] Scheier, E. & Kittner, N. (2022, January). A measurement strategy to address disparities across household energy burdens. *Nature*, 13. https://www.nature.com/articles/s41467-021-27673-y.

[104] United States Department of the Treasury, Federal Insurance Office. (2025, January). *Analyses of U.S. Homeowners Insurance Markets, 2018–2022: Climate-Related Risks and Other Factors.* https://climateriskadvisors.com/resources/analyses-us-homeowners-insurance-markets-2018-2022.pdf.

BENCHMARK #3.2:

# Public infrastructure is built to last and lowers public and private costs.



**COMMUNITIES AND BUSINESSES DEPEND ON INFRASTRUCTURE THAT WAS OFTEN SITED AND DESIGNED FOR PAST CONDITIONS YET NOW FACES RISING CLIMATE STRESS, AGING ASSETS, AND GROWING PUBLIC AND PRIVATE COSTS FROM OUTAGES, FLOODING, HEAT, AND REPEATED DAMAGE.** Without a stronger federal focus on durable, climate-ready, and cost-saving investments across these systems, infrastructure will become less reliable, less affordable, and less able to support long-term economic resilience. This section provides policy options for six key challenges:

1. Rebuilding for past risks and conditions
2. Extreme heat and the rising cost of staying cool
3. Aging electric grids
4. Fragile, uneven, and unaffordable communications networks
5. Stormwater and flood-risk infrastructure designed for historical conditions
6. A generational backlog of water and wastewater investment needs



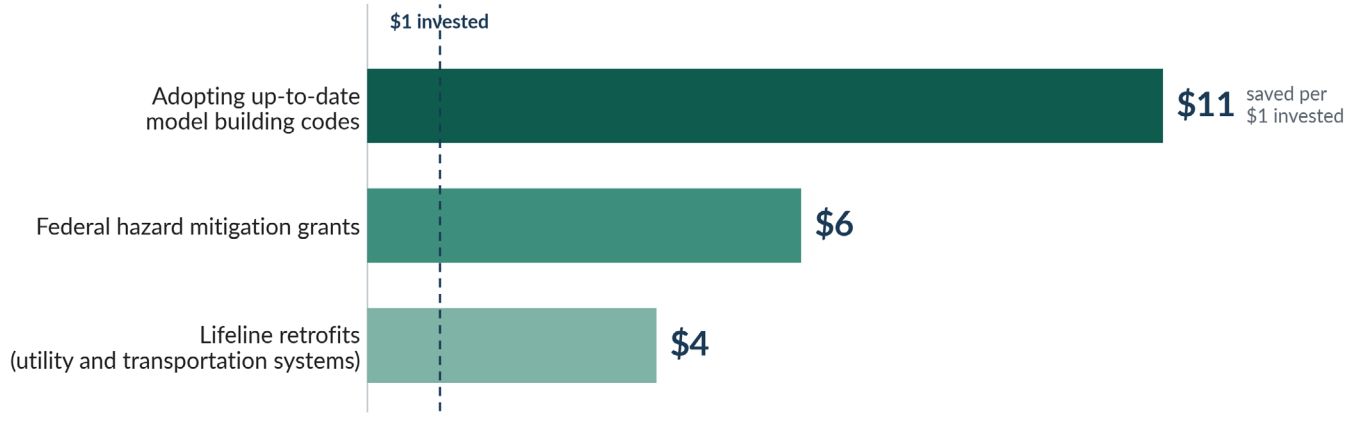
**Challenge – Rebuilding for past risks and conditions:** Federal infrastructure spending too often funds rebuilding to past conditions, locking communities and consumers into avoidable greenhouse gas (GHG) emissions and disaster losses, higher operating costs, and repeated taxpayer-funded recovery, instead of delivering durable, multi-benefit assets that lower long-term costs.

## Policy Options:

- Require federally funded and permitted infrastructure projects to:
  - Harden public infrastructure systems against cyber-related threats and expand grants to infrastructure owners and operators to modernize technology and strengthen practices.
  - Incorporate forward-looking climate projections and future hazard conditions, including extreme heat, flooding, drought, wildfire, and sea level rise, in siting, design, construction, and rehabilitation.
  - Prioritize federal investment criteria, including updated discounts rates for projects that demonstrably reduce long-term public costs from disaster response and recovery, and lifecycle management and true-cost accounting for benefit-cost analysis factoring the full asset lifetime costs and benefits, including avoided healthcare and productivity losses.
- Reward projects through federal selection criteria, scoring, and benefit-cost guidance that deliver multiple benefits, including risk reduction, household and small-business affordability, public health, workforce development, ecosystem restoration, GHG emissions reduction, and local economic development, so federal dollars produce greater consumer and community returns per dollar invested.
- Support the creation and operation of Community Resilience Hubs through federal funding and technical assistance:
  - Centralize information, engagement, and technical assistance for families and businesses to address extreme heat, power outages, smoke events, public health incidents, emergency response, and recovery.
  - Require a deliberate focus on lower-income, rural, Tribal, and historically underserved households whose options are most limited when systems fail.
  - Leverage the capacity of the departments and agencies best positioned to accelerate and expand these important services, including FEMA, DOE, HUD, the U.S. Environmental Protection Agency (EPA), USDA, the National Oceanic and Atmospheric Administration (NOAA), and the U.S. Department of Health and Human Services (HHS).
- Create durable federal demand for clean construction materials through a paired mandate and incentive:
  - Direct federal infrastructure finance and grant programs to require clean steel, concrete, and critical power electronics in the projects they support, with a narrow waiver only where compliant materials remain unavailable.
  - Authorize federal advance market commitments and contracts for differences that cover the price gap between clean and conventional materials, so the cost of the transition is carried by the federal government rather than by state and local budgets and the consumers who fund them.

### Resilience pays: every federal dollar invested in mitigation returns more

Benefit–cost ratio of natural hazard mitigation, by strategy (savings per $1 invested)




Graphic: SEEC Institute. Source: NIBS Natural Hazard Mitigation Saves: 2019 Report. (2019).

## Policy Context:

Public infrastructure is a consumer product. Households pay for it twice, once through taxes and rates, and again when it fails. The National Institute of Building Sciences (NIBS) found that adopting up-to-date model building codes returns $11 per $1 invested, federal mitigation grants return $6 per $1, and utility and transportation retrofits return $4 per $1, demonstrating that risk-informed infrastructure investment is among the highest-return uses of federal dollars.[105] Yet federal disaster spending continues to climb. From 1980 through March 2026, the United States averaged just over nine billion-dollar weather and climate disasters a year, with an average annual cost of over $65 billion, yet experienced 27 events in 2024 alone, costing more than $180 billion total in damage.[106]

The materials in public infrastructure are themselves a major emissions source. Iron and steel, cement and concrete, chemicals, food and beverage, and petroleum refining together account for roughly half of energy-related $CO_2$ emissions in the U.S. industrial sector.[107] Because government is the dominant purchaser of steel and concrete for infrastructure, federal procurement policy is the single strongest lever for creating the demand certainty that clean materials manufacturers need to invest. Requiring forward-looking climate data in federally supported projects, prioritizing investments that reduce long-term public costs, rewarding multi-benefit projects, and supporting resilience hubs will convert federal infrastructure spending into a tool for protecting consumers, stabilizing local fiscal health, safeguarding against future disasters, and growing the construction, engineering, and trades workforce, advancing long-term, sustainable growth.

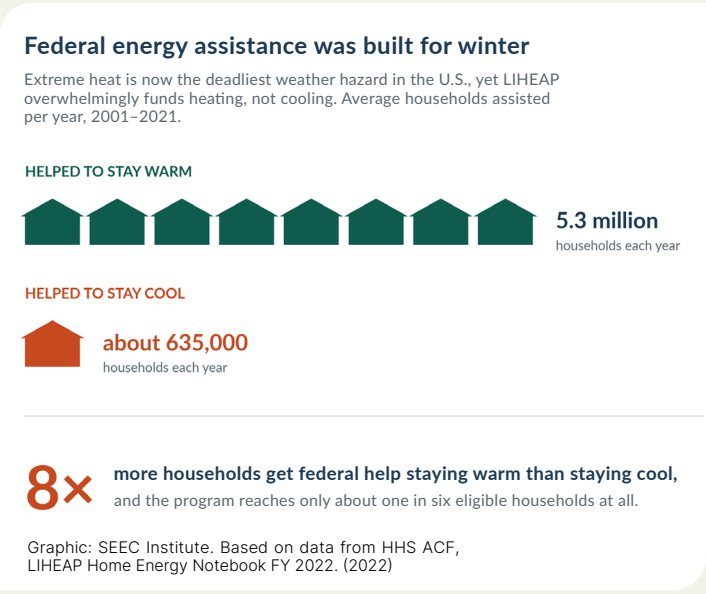
**Challenge – Extreme heat and the rising cost of staying cool:** Extreme heat now stresses every infrastructure system consumers depend on, buckling roads, derating transformers, and driving record peak electricity demand, while millions of households face summers in homes with no air conditioning, broken equipment they cannot afford to fix, or cooling they cannot afford to run. The federal program built to keep Americans safe at home, the Low Income Home Energy Assistance Program (LIHEAP), was designed for a home heating era and has not caught up to the deadliest weather hazard in America.

## Policy Options:

- Modernize LIHEAP to ensure it works for both cold and hot climates, provide significant funding increase to the program, and condition state receipt on utility shutoff protections during extreme heat events equivalent to the cold-weather protections most states already require.
- Treat residential cooling as essential infrastructure: make efficient cooling equipment, including heat pumps that cut both summer and winter bills, a standard eligible measure across LIHEAP, the Weatherization Assistance Program (WAP), and federal housing retrofit funding, paired with the envelope improvements and distributed solar and storage that make cooling affordable to run, not merely present.

## Policy Context:

Cooling is now a survival utility, priced like a luxury. The U.S. Energy Information Administration's (EIA) residential survey shows 11% of U.S. households have no air conditioning, and roughly 6 million more have equipment they cannot use because it is broken or unaffordable to run.[108] LIHEAP reaches only about one in six eligible households and is based on outdated 1980s heating patterns. From 2001 through 2021, an average of 5.3 million households received annual heating assistance, compared to the roughly 635,000 for cooling.[109,110] A program modernized for cooling as well as heating, a formula that reflects the climate consumers live in, and cooling equipment treated as core infrastructure will convert the deadliest weather hazard in America from a private affordability crisis into a solvable public one. The health dimensions of extreme heat, including workplace, school, and healthcare standards, are addressed in the public health benchmark of this chapter.




[105] National Institute of Building Sciences. (2019, December). *Natural Hazard Mitigation Saves: 2019 Report*. https://nibs.org/projects/natural-hazard-mitigation-saves-2019-report/.

[106] Climate Central. (2026). *U.S. Billion-Dollar Weather and Climate Disasters.* https://www.climatecentral.org/climate-services/billion-dollar-disasters.

[107] United States Department of Energy. (2022, September). *Industrial Decarbonization Roadmap*, DOE/EE-2635. https://www.osti.gov/servlets/purl/1961393/.

[108] United States Energy Information Administration. (2022, March). 2020 Residential Energy Consumption Survey. https://www.eia.gov/consumption/residential/data/2020/.

[109] United States Department of Health and Human Services, Administration for Children and Families. (n.d.). *Low Income Home Energy Data for Fiscal Year 2022*. https://acf.gov/sites/default/files/documents/ocs/RPT_LIHEAP_HEN01HEData_FY2022.pdf.

[110] United States Department of Health and Human Services, Administration for Children and Families. (n.d.). *LIHEAP Fact Sheet*. https://acf.gov/ocs/fact-sheet/liheap-fact-sheet.

**Challenge – Aging electric grids:** Aging grid infrastructure, growing climate and extreme-weather stress, and rising energy demand are driving more frequent and longer power outages and higher energy costs for households and businesses, even as cleaner, distributed, and more resilient technologies remain under-deployed in the communities that need them most.

## Policy Options:[111]

- Align federal funding and standards across housing, infrastructure, and disaster programs to drive resilient, energy-smart infrastructure. Condition federal housing, infrastructure, and disaster funding on state and local adoption of modern energy codes, resilient infrastructure siting practices, and integrated planning that reduces energy demand while enabling solar, electrification, energy storage, and other distributed energy resources (DER).
- Expand federal financing and incentives for distributed clean energy and resilient power systems. Scale federal tax credits, grants, and low-cost financing for Community Resilience Hubs, microgrids, distributed solar paired with storage, and clean backup power for critical community facilities, affordable housing, schools, healthcare facilities, and water and wastewater systems, with priority to communities facing the highest outage exposure and energy burdens.
- Provide national climate-risk data, planning support, technical assistance, and regulatory guidance through federal agencies to help states, Tribes, and local governments modernize grids, integrate DERs, harden critical infrastructure, and reduce energy burdens for households, supporting durable affordability and grid reliability.
- Establish federal standards for very large electricity loads, including data centers, so that consumers never subsidize load growth they did not create:
  - Direct Federal Energy Regulatory Commission (FERC) and state partners to require that large loads pay the full incremental cost of the generation, transmission, and distribution they drive.
  - Require public disclosure of special contracts between utilities and large-load customers, ending the opaque proceedings that shift costs onto household ratepayers.
  - Set efficiency, demand-flexibility, and on-site power standards for federally supported or federally contracted data centers, so the nation's fastest-growing electricity demand arrives as a grid asset rather than a grid burden.
- Close the federal cybersecurity gap at the distribution grid:
  - Extend mandatory, minimum cybersecurity standards to distribution utilities, aggregated DERs, and the smart inverters, advanced metering, and remote-access control systems now embedded in local service.
  - Direct DOE, with the Cybersecurity and Infrastructure Security Agency (CISA) and FERC, to address distribution-system and supply chain risk in national grid cybersecurity planning.
  - Fund compliance for the small, rural, municipal, and cooperative utilities that lack dedicated security staff, so that a federal standard does not arrive as an unfunded mandate passed through to ratepayers.
  - Require federally supported grid modernization, distributed energy, and community resilience hub investments to meet the standard at installation rather than through costly retrofit, treating cyber intrusion alongside storms and extreme heat as a foreseeable cause of the outages consumers ultimately pay for.

## Policy Context:

Power outages empty refrigerators when families are already struggling to afford groceries, risk disrupting life-sustaining equipment for electricity-dependent Medicare beneficiaries, and shut down remote work and telehealth access. DOE estimated that weather-related power outages alone cost the U.S. economy an inflation-adjusted average of $44 billion per year,[112] with major-storm years such as 2008 (Hurricane Ike) in and 20212 (Superstorm Sandy) producing far higher costs.[113] GAO has found that climate change is expected to have far-reaching effects on the electricity grid, that annual costs of weather-related outages total billions of dollars and may rise with climate change, and that resilience investments could help address these effects, concluding that DOE and FERC need to take stronger action to identify and manage these risks.[114]

> DOE estimated that weather-related power outages alone cost the U.S. economy an inflation-adjusted average of $44 billion per year, with major-storm years such as 2008 (Hurricane Ike) and 2012 (Superstorm Sandy) producing far higher costs.

Demand growth is compounding the strain. Data-center electricity use tripled over the past decade and could double or triple again by 2028, reaching as much as 12% of U.S. electricity consumption.[115] Utilities are already shifting data center costs onto household ratepayers through special contracts approved in opaque state processes.[116] Without federal cost allocation and transparency standards, consumers will pay twice, once through outages from a strained grid and again through rates inflated by someone else's load. Aligning

[111] Policy Options set forth here align closely with those in Chapter 5: Cheap, Abundant, and Clean American Energy for All, Benchmarks #5.2, #5.6, and #5.7.

[112] Lawrence Berkeley National Laboratory. (2018, June). *Improving the Estimated Cost of Sustained Power Interruptions to Electricity Customers*. https://emp.lbl.gov/publications/improving-estimated-cost-sustained.

[113] United States Department of Energy & Executive Office of the President. (2013, August). *Economic Benefits of Increasing Electric Grid Resilience to Weather Outages*. https://www.energy.gov/sites/prod/files/2013/08/f2/Grid%20Resiliency%20Report_FINAL.pdf.

[114] United States Government Accountability Office. (2021, March). *Electricity Grid Resilience: Climate Change Is Expected to Have Far-Reaching Effects and DOE and FERC Should Take Actions*, GAO-21-346. https://www.gao.gov/products/gao-21-346.

[115] Shehabi, A. et al. (2024, December). *2024 United States Data Center Energy Usage Report*. Lawrence Berkeley National Laboratory. https://eta-publications.lbl.gov/sites/default/files/2024-12/lbnl-2024-united-states-data-center-energy-usage-report_1.pdf.

[116] Peskoe, A. & Martin, E. (2025, March). *Extracting Profits from the Public: How Utility Ratepayers Are Paying for Big Tech's Power*. Harvard Law School Electricity Law Initiative. https://eelp.law.harvard.edu/extracting-profits-from-the-public-how-utility-ratepayers-are-paying-for-big-techs-power/.

federal funding with modern energy codes, scaling distributed clean energy and resilience hubs, and equipping states and communities with better data and planning tools will turn the grid into a more affordable, reliable platform for consumers, while creating durable demand for domestic clean energy manufacturing, construction, and skilled-trades jobs.

GAO found that distribution systems are growing more vulnerable in part because their industrial control systems increasingly allow remote access and connect to business networks, that the distribution utilities in its review are generally not subject to mandatory federal cybersecurity standards, and that DOE's plans do not fully address distribution-system risk because it has prioritized generation and transmission.[117]

**Challenge – Fragile, uneven, and unaffordable communications networks:** Modern households, businesses, schools, and health providers depend on broadband and other communications systems for everything from work and learning to telehealth and emergency alerts. Yet, too many networks remain unaffordable, fragile in extreme weather, and unevenly available across rural, Tribal, and underserved areas, leaving customers cut off when they can least afford to be.

## Policy Options:

- Expand, accelerate, and better target federal broadband funding to build affordable, climate-resilient networks that can withstand extreme weather, reduce outages, and ensure universal access for households, small businesses, schools, libraries, and health providers, including continued support for affordability programs that help LMI households stay connected.
- Direct federal agencies and funding recipients to deploy buried, redundant, and climate-hardened fiber infrastructure within transportation, utility, and community projects to improve reliability, speed disaster recovery, and reduce long-term repair costs.
- Establish federal grant, loan, and resilience standards to harden communications towers and systems against wind, flood, wildfire, heat, and power loss, with priority for rural areas, evacuation corridors, and underserved communities where loss of communications service can be life-threatening.
- Strengthen federal siting, design, and performance standards for data centers to improve physical resilience, energy and water efficiency, grid reliability, noise pollution, and consumer rate stability, and encourage siting in willing host communities with lower long-term climate, water, and grid risk, so that surging digital demand does not crowd out affordability and resilience for existing customers and adjacent communities.
- Modernize federal investment, authorities, procurement, and coordination to ensure resilient satellite communications capacity, so that communications, navigation, and remote connectivity continue when terrestrial systems fail.
- Expand and accelerate the deployment of federal technical and financial assistance to programs that support interoperable, redundant, and climate-resilient emergency communications systems, so that first responders, public agencies, hospitals, and communities, including vulnerable populations, can maintain reliable communications before, during, and after disasters.
- Recognize local broadcast radio as lifeline infrastructure by making stations serving as designated emergency information sources eligible for federal hazard mitigation and resilience funding for backup power, hardened transmitters, and redundant studio-to-transmitter links, and permanently authorize the Next Generation Warning System Grant Program (NGWSGP), extending FEMA's Primary Entry Point hardening model to local stations.

## Policy Context:

Communications infrastructure is a basic consumer necessity. The Federal Communications Commission (FCC) reported that approximately 24 million Americans, including roughly 28% of those in rural areas and 23% of those on Tribal lands, lacked access to fixed terrestrial broadband at 100/20 megabits per second (Mbps) as of year-end 2022, an availability gap that compounds affordability gaps and translates directly into lost access to jobs, education, healthcare, and emergency information.[118] Disasters expose the fragility of these systems as storms, wildfires, floods, and extreme heat regularly take down cell towers, fiber lines, and emergency communications precisely when customers, survivors, and first responders need them most. In 2024, Hurricane Helene made the point concretely: with 54% of cell sites in impacted North Carolina counties out of service days after landfall, local radio stations became the primary source of survival information for entire communities.[119] Targeted federal investment in resilient broadband, hardened wireless and fiber, performance standards for data centers, modernized satellite capacity, and interoperable emergency communications will protect households and small businesses from preventable disruption, supports rural economic competitiveness and telehealth, and create skilled construction and operations jobs across the country.

[117] United States Government Accountability Office. (2021, March). *Electricity Grid Cybersecurity: DOE Needs to Ensure Its Plans Fully Address Risks to Distribution Systems*, GAO-21-81. https://www.gao.gov/products/gao-21-81.

[118] Federal Communications Commission. (2024, March). *2024 Section 706 Report (Fourteenth Broadband Deployment Report)* https://docs.fcc.gov/public/attachments/FCC-24-27A1.pdf.

[119] Federal Communications Commission. (2024, October 1). *Hurricane Helene: Communications Status Reports*. https://www.fcc.gov/helene.



**Challenge – Stormwater and flood-risk infrastructure designed for historical conditions:** Aging stormwater systems, levees, dams, and drainage networks were largely designed for historical rainfall and flood patterns, leaving households, small businesses, and local governments increasingly exposed to costly, repetitive flood damage, rising insurance burdens, and prolonged disruption as storms and droughts intensify and precipitation patterns shift.

## Policy Options:

- Significantly expand federal investment in green and hybrid flood-risk infrastructure, including stormwater systems, flood control projects, levee improvements, and nature-based solutions such as removal of high-hazard dams, watershed and wetlands restoration, floodplain reconnection, and urban green stormwater infrastructure, to reduce flood risk, damages, insurance costs, and disaster recovery spending. Additional funds should also support programs that attract private investment in flood risk reduction and water infrastructure through public-private partnerships.
- Deploy increased technical and financial assistance to help local project sponsors exhaust all nonstructural and hybrid options to fully integrate nature-based solutions:
  - Maximize reliance on federally supported, community-led, voluntary buyouts and relocations discussed above and below, before selecting a traditional engineered gray infrastructure approach that will require significant ongoing investments in operations and maintenance.
  - Fully implement the recommendations of the National Committee on Levee Safety to reduce the risks and costs of levee-related disasters.
- Require the U.S. Army Corps of Engineers (USACE), FEMA, DOE, USDA, and any other department or agency funding water-related infrastructure to integrate future climate and precipitation risk, including future conditions hydrology, into federal water and flood infrastructure design standards, permitting, and capital planning, including for federally supported levees, dams, canals, stormwater systems, and culverts, so that public dollars do not lock in maladaptive assets that fail under foreseeable conditions.
- Require coordinated water, land-use, and transportation planning through federal programs to reduce flood exposure, protect critical infrastructure, and maintain access for residents, emergency responders, and supply chains during extreme events.
- Establish a federal framework for incorporating nonstationarity into federal water-related policies and programs, including advancing updates to precipitation frequency estimates such as NOAA's Atlas 14 and successors, and drought assessments and indicators addressing operational needs and long-term planning for water management, infrastructure, and adaptation.

## Policy Context:

Flood-related disasters are the most common, repetitive, and most consumer-facing hazard category. NOAA's billion-dollar disasters database shows that floods, tropical cyclones, and severe storms have driven the bulk of $3.1 trillion in CPI-adjusted U.S. disaster costs since 1980, with much of that damage concentrated in homes, small businesses, and local infrastructure.[120] Investing in modern green and gray flood infrastructure, designing federally supported water assets for current and future precipitation, and coordinating water, land-use, and transportation planning will lower insurance and disaster recovery costs, protect local tax bases and small-business revenues, and supports a durable construction and engineering workforce to catalyze consumer-centered, affordability-focused growth.

[120] Climate Central. (2026). *U.S. Billion-Dollar Weather and Climate Disasters*. https://www.climatecentral.org/climate-services/billion-dollar-disasters. Flooding, tropical cyclones, and severe storms together account for the majority of CPI-adjusted U.S. disaster costs since 1980.



**Challenge – A generational backlog of water and wastewater investment needs:** America's drinking water and wastewater systems face decades of deferred capital investment, mounting climate stress on supplies and treatment, persistent lead contamination, and rising household water bills, all of which threaten public health, consumer affordability, and the ability of communities to attract investment and grow.

## Policy Options:

- Authorize, fund, and use a national climate risk index to prioritize, expand, and accelerate federal water investments, including Clean Water and Drinking Water State Revolving Funds (CWSRF and DWSRF) and the *Water Infrastructure Finance and Innovation Act* (WIFIA) program, and require water utilities to plan for climate-driven capital needs, ensuring that federal dollars flow first to systems most exposed to drought, flooding, sea level rise, and extreme weather.
- Protect drinking water sources and water quality through federal investment in watershed management, source-water protection, and climate-informed planning, reducing downstream treatment costs and protecting communities from contamination events.[121]
- Modernize water supply infrastructure through federal support, including treatment facilities, storage, and conveyance systems, to improve reliability, reduce service disruptions, and limit water loss. Diversify water supply strategies, especially in arid and water-stressed regions and in support of sustainable agricultural practices, through conservation, efficiency, water reuse, stormwater capture, and alternative sources to address drought, extreme heat, and long-term scarcity.[122]
- Build on existing programs to accelerate and prioritize expanded federal investment in full lead service line replacement in small, rural, Tribal, and historically underserved communities, including public schools, facing persistent water quality, reliability, and compliance challenges that threaten public health and community investability.

[121] For additional information on watershed and related issues, visit Chapter 4: Safe, Clean, and Prosperous Ecosystems.

[122] For additional information on water supply and agriculture, visit Chapter 1: 21st Century Agricultural Opportunities

- Reduce household water cost burdens through federally supported water affordability programs, customer assistance, and rate-design technical assistance that protects LMI households from unaffordable bills and shutoffs, including a permanent low-income water assistance program modeled on the Low-Income Household Water Assistance Program (LIHWAP) and funded separately from, not at the expense of, LIHEAP.
- Strengthen community engagement, technical assistance, and governance capacity, particularly for small and under-resourced systems, so that federal water investments deliver durable, equitable outcomes, support local workforce development, and build the management capacity needed to operate modern, climate-ready systems.
- Close the statutory gap that leaves most of the nation's water and wastewater systems under no federal cybersecurity requirement:
    - Extend the risk and resilience assessment and emergency response plan mandate of Section 2013 of *America's Water Infrastructure Act* to wastewater systems and to small drinking water systems, with compliance funding and shared-services technical assistance sized to the systems being asked to comply.
    - Grant EPA the authority under the *Safe Drinking Water Act and Clean Water Act* to require correction of identified vulnerabilities and to set minimum operational-technology security practices, including elimination of default and shared credentials, use of multifactor authentication, prompt revocation of former-employee access, and removal of internet-exposed control interfaces on programmable logic controllers and human-machine interfaces.
    - Resource EPA as the sector risk management agency, in coordination with CISA, to operate a water cybersecurity circuit-rider and incident-response capability for small, rural, and Tribal systems unable to staff a security function of their own.
    - Make cybersecurity an eligible and prioritized use across the CWSRF and DWSRF and WIFIA, so that federal water dollars buy defended systems rather than newly automated ones, and so that a federal floor arrives with federal funding rather than as a rate increase on households.

## Policy Context:

Water service is the consumer-facing infrastructure most households interact with daily, and the gap between needs and investment is large and growing. The EPA's most recent Drinking Water Infrastructure Needs Survey and Assessment estimates a 20-year national drinking water infrastructure need of approximately $625 billion for states and territories, including roughly more than $420 billion for distribution and transmission and $107 billion for treatment, with an estimated 9.2 million projected lead service lines nationwide that continue to expose families, especially children, to a potent neurotoxin.[123] EPA's 2024 Water Affordability Needs Assessment quantifies the household side of that gap: roughly one in ten U.S. households lack affordable access to water services, and the annual cost of unaffordable water bills runs more than $5 billion.[124] A federal response has already been proven at scale. LIHWAP, created in the Fiscal Year (FY) 2021 Consolidated Appropriations Act, reached more than 1.5 million households before its funding lapsed.[125] These needs land disproportionately on small, rural, Tribal, and historically underserved water systems with the least capacity to finance them, driving rate increases that strain household budgets even as climate stress raises the cost of compliance and reliability. Using a national climate risk index to target federal water funding, modernizing supply infrastructure, diversifying supplies, accelerating lead service line replacement, supporting water affordability, and building community capacity will protect public health, stabilize local economies and tax bases, and ensures that federal water spending advances both consumer affordability and long-term competitiveness.

Water systems are now a standing target of nation-state actors. CISA and its federal partners issued an advisory on Iranian-affiliated exploitation of programmable logic controllers across U.S. critical infrastructure in July 2026.[126] The exposure is broad and documented: an EPA Office of Inspector General passive scan of 1,062 drinking water systems serving more than 193 million people identified 97 systems serving approximately 26.6 million users with critical or high-risk vulnerabilities, and an additional 211 systems serving more than 82.7 million people with externally visible open portals. EPA's own May 2024 enforcement alert found that more than 70% of inspected water systems fail to comply with the assessment requirements already on the books.[127] GAO reported that EPA has identified a lack of cybersecurity risk assessment requirements for wastewater systems and certain drinking water systems, along with significant limitations in its authority under federal drinking water and clean water laws to close those gaps.[128]

[123] United States Environmental Protection Agency. (2023, September). *7th Drinking Water Infrastructure Needs Survey and Assessment*. https://www.epa.gov/dwsrf/epas-7th-drinking-water-infrastructure-needs-survey-and-assessment..

[124] United States Environmental Protection Agency. (2024, December). *Water Affordability Needs Assessment: Report to Congress*. https://www.epa.gov/system/files/documents/2024-12/water-affordability-needs-assessment.pdf.

[125] United States Department of Health and Human Services, Administration for Children and Families. (2024, December). *Low Income Household Water Assistance Program (LIHWAP)*. https://acf.gov/ocs/programs/lihwap.

[126] Cybersecurity and Infrastructure Security Agency. (2026, July). *Iranian-Affiliated Cyber Actors Exploit Programmable Logic Controllers Across US Critical Infrastructure, AA26-097A*. https://www.cisa.gov/news-events/cybersecurity-advisories/aa26-097a; CISA Urges Water and Wastewater Systems Sector to Protect OT Against Activity Targeting PLCs (July 2026), https://www.cisa.gov/news-events/alerts/2026/07/30/cisa-urges-water-and-wastewater-systems-sector-protect-ot-against-activity-targeting-plcs.

[127] United States Environmental Protection Agency, Office of Inspector General. (2024, November). *Management Implication Report: Cybersecurity Concerns Related to Drinking Water Systems*, Report No. 25-N-0004. https://www.epa.gov/sites/default/files/oig/documents/Full%20Report%2025-N-0004_Errata.pdf.

[128] United States Government Accountability Office. (2026, May). *Critical Infrastructure Protection: Actions Needed to Address Persistent Cybersecurity Threats to the Water and Wastewater Sector*, GAO-26-109159. https://www.gao.gov/products/gao-26-109159.

BENCHMARK #3.3:

# Transportation systems allow people and goods to move affordably and reliably, now and into the future.

**TRANSPORTATION SYSTEMS ENABLE ECONOMIC GROWTH, SUPPLY CHAIN RELIABILITY, AND GLOBAL COMPETITIVENESS, AND THEY IMPACT HOUSEHOLD BUDGETS EVERY DAY.** These systems are straining under the combined pressures of rising household costs, aging and vulnerable infrastructure, inequitable access, and growing climate and disaster disruptions that threaten mobility, supply chains, and competitiveness. **WITHOUT SUSTAINED FEDERAL ACTION TO MAKE SURFACE, MARITIME, AND AVIATION TRANSPORTATION CLEANER, MORE AFFORDABLE, AND MORE RESILIENT, COMMUNITIES AND BUSINESSES FACE HIGHER COSTS, GREATER DISRUPTION, AND REDUCED ACCESS TO JOBS, HEALTHCARE, EDUCATION, AND ESSENTIAL SERVICES.** This section provides policy options for five key challenges:

1. High household transportation costs and access gaps
2. Infrastructure that fails under flooding, heat, wildfire, and severe storms
3. Emissions, traffic deaths, and operating costs that fall hardest on vulnerable populations
4. Aging, climate-exposed, and polluting maritime infrastructure that raises costs
5. Strained aviation infrastructure that drives delays, higher fares, and weaker regional connectivity



## Challenge – High household transportation costs and access gaps:

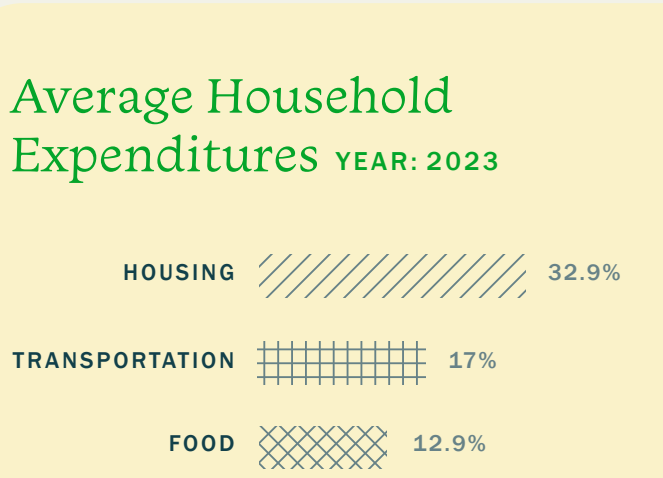
Transportation is the second largest expense in most American household budgets, yet too many consumers, particularly in rural, Tribal, and low-income urban communities, face high vehicle and fuel costs, limited or unreliable transit, and weak first- and last-mile connections that cut off access to jobs, healthcare, education, and essential services.

## Policy Options:[129]

- Establish a national federal accessibility standard for federal transportation investment with the goal that every American household can reach employment, a primary care provider, K-12 school, and a grocery store within 30 minutes by at least one affordable mode of transportation, defined as a transportation option whose cost does not exceed a specified share of household income and that is reasonably available to the user population. Operationalize the standard through a federal access map updated annually, with an explicit federal floor for service levels in underserved areas, and condition federal transportation grants on demonstrable closure of access gaps measured against progress toward the standard.
- Develop and phase in a unified Housing + Transportation (H+T) Affordability Standard across federal programs that measures household affordability and federally backed mortgage underwriting, as the primary federal definition of cost burden. Establish a Combined H+T Cost Cap benchmark and incorporate it into affordable housing siting decisions, transportation investment scoring, and federal infrastructure benefit-cost analysis. Over time, align federal incentives to discourage investments that increase transportation cost burdens and reward projects that reduce combined housing and transportation costs for households.
- Require federally subsidized and federally backed housing serving LMI households to demonstrate that the combined housing-and-transportation cost burden for a target income tier falls below the combined H+T cost cap. Provide federal technical assistance and incentives for transit-served siting, employer mobility benefits, and integrated land-use, housing, and workforce planning that delivers durable affordability rather than rent relief consumed by transportation costs.
- Lower the cost of capital that consumers ultimately repay through fares, taxes, and ticket prices by modernizing the U.S. Department of Transportation's (DOT) Build America Bureau credit programs:
  - Provide the Railroad Rehabilitation and Improvement Financing (RRIF) program with standing credit subsidy appropriations, on the model of the DOE Loan Programs Office (LPO), so that public applicants no longer must self-fund their own credit risk premiums.
  - Amend *23 U.S.C. § 603* to remove the investment-grade rating requirement for *Transportation Infrastructure Finance and Innovation Act* (TIFIA) loans, relying instead on the Build America Bureau's own underwriting to assess creditworthiness, so that smaller, rural, and unrated project sponsors gain access to the same low-cost federal capital as large investment-grade issuers rather than competing for oversubscribed grant programs.

## Policy Context:

Transportation is a consumer affordability issue first and foremost. The U.S. Bureau of Labor Statistics (BLS) reports that transportation accounted for 17% of average household expenditures in 2023, second only to housing at 32.9% and ahead of food at 12.9%.[130] **FOR MOST AMERICAN HOUSEHOLDS, THE COST OF GETTING TO WORK, SCHOOL, THE DOCTOR, AND THE GROCERY STORE IS THE SINGLE LARGEST NON-HOUSING LINE ITEM IN THE FAMILY BUDGET.** Vehicle insurance alone has risen sharply in recent years, compounding the affordability squeeze. Households without reliable transit, intercity bus, or rail options bear those costs whether or not they can afford to own and operate a car. Rural, Tribal, and low-income urban communities often face the steepest combined housing-and-transportation cost burdens. RRIF's requirement that borrowers pay their own credit risk premium up front has left the program chronically underused relative to its lending capacity, while TIFIA's investment-grade rating requirement screens out precisely the smaller and rural sponsors with the fewest financing alternatives. A federal access standard, lower capital costs, and an integrated H+T affordability framework will convert federal transportation policy from a collection of programs into a coherent consumer-affordability strategy, advancing consumer-centered, affordability-focused solutions while supporting durable economic competitiveness.




[129] Policy Options set forth here that address needs of under-resourced rural and Tribal communities align closely with Chapter 2: Growing Rural and Tribal Economies.

[130] United States Bureau of Labor Statistics. (2024, September). *Consumer Expenditures—2023*, News Release USDL-24-1862. https://www.bls.gov/news.release/archives/cesan_09252024.htm. Housing accounted for the largest share of household expenditures (32.9%), followed by transportation (17.0%) and food (12.9%).

**Challenge – Infrastructure that fails under flooding, heat, wildfire, and severe storms:** Highways, bridges, transit systems, ports, and rail corridors increasingly fail under flooding, extreme heat, wildfires, and severe storms, stranding workers and patients, breaking supply chains, and triggering repeated taxpayer-funded reconstruction costs that consumers ultimately pay through taxes, tolls, fares, and goods prices.

## Policy Options:

- Establish a National Climate-Ready Transportation Standard, modeled in scope and durability on the *Americans with Disabilities Act* (ADA), to apply to every federally funded or federally permitted transportation asset, with explicit performance criteria for service continuity, occupant safety, and asset survival under defined forward-looking climate scenarios:
  - Set minimum requirements through the standard for elevation in flood zones, transit facility shading, materials and pavement designed for extreme heat, wildfire-hardened design in fire zones, and stormwater capacity for projected precipitation, replacing today's patchwork of program-specific guidance with a unified, enforceable consumer protection floor.
  - Scope the standard with full application to new construction and complete reconstruction, proportional application to the portions of an asset being altered, subject to a disproportionality cap, and exempting routine maintenance.
  - Scale the DOT Federal Highway Administration (FHWA) Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation (PROTECT) formula and discretionary programs to serve as the standard's primary delivery vehicle, with a defined suballocation to the local governments that own roughly three-quarters of the nation's road miles, and make resilience an eligible use across major formula and discretionary programs.
- Operate a single, federally authoritative, continuously updated National Transportation Vulnerability Atlas as the geospatial dataset of climate risk, current and projected, for every federally funded transportation asset. Mandate its use in project selection, environmental review, asset management, federal benefit-cost analysis, and federally backed transportation finance. Integrate NOAA, the U.S. Geological Survey (USGS), FEMA, and the U.S. Global Change Research Program (USGCRP) data through the atlas into a single decision-ready tool, ensuring that federal dollars, state transportation departments, Metropolitan Planning Organizations (MPOs), and private capital all plan against the same forward-looking risk picture.
- Require federally funded reconstruction of transportation assets after a declared disaster to build to the above-described National Climate-Ready Transportation Standard or relocate the asset out of an indefensible location, ending the federal cycle of repeatedly funding the rebuild of the same vulnerable structures. Pair the rule with:
  - Peer-reviewed, pre-approved state and local mitigation plans that move faster than today's sequential review.
  - Expedited federal environmental review and permitting for reconstruction that meets or exceeds the standard, performance-based contracting that places resilience warranties on contractors.
  - Pre-funded federal resilience reserves that auto-deploy after declared events instead of waiting for ad hoc disaster supplementals.
- Establish federal authority and dedicated funding to plan and execute the proactive, community-led relocation of transportation assets, including coastal highway segments, bridges, transit yards, and rail lines, in locations where projected climate risk renders ongoing reinvestment economically irrational. Ensure full integration into community-led relocation programs covered under the housing and disaster recovery benchmarks of this chapter.

## Policy Context:

Disaster losses to transportation are systemic and recurring. Much of the damage from the more than 400 individual billion-dollar weather and climate disasters in the United States from 1980 through 2026 concentrated in roads, bridges, transit, and freight infrastructure.[131] When transportation fails, consumer costs cascade: workers lose income, patients miss medical care, students lose school days, freight slows or reroutes at higher cost, and small businesses lose customers. **A UNIFIED FEDERAL CLIMATE-READY TRANSPORTATION STANDARD, A SINGLE AUTHORITATIVE NATIONAL VULNERABILITY ATLAS, A HARD RULE AGAINST REBUILDING THE SAME FAILURE TWICE, AND AUTHORITY FOR STRATEGIC RELOCATION OF INDEFENSIBLE ASSETS TOGETHER CAN REPLACE TODAY'S FRAGMENTED FEDERAL POSTURE WITH A COHERENT SYSTEM THAT PROTECTS CONSUMERS, LOWERS LONG-TERM FEDERAL DISASTER SPENDING, AND SUPPORTS CONTINUOUS SUPPLY CHAIN OPERATIONS AND U.S. ECONOMIC COMPETITIVENESS.**

[131] Climate Central. (2026). *U.S. Billion-Dollar Weather and Climate Disasters*. https://www.climatecentral.org/climate-services/billion-dollar-disasters.

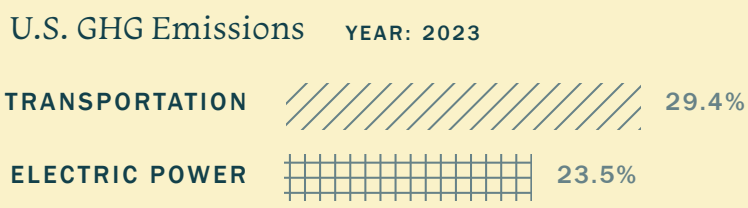
**Challenge — Emissions, traffic deaths, and operating costs that fall hardest on vulnerable populations:** U.S. surface transportation remains the largest source of GHG emissions and a major source of air pollution, traffic deaths, and household operating costs, with disproportionate harms borne by lower-income households, communities of color, pedestrians, cyclists, seniors, and people with disabilities living near high-traffic corridors and lacking safe mobility options.

## Policy Options:

- Restructure federal clean vehicle incentives around direct pay so that they operate as a universal consumer benefit delivered at point-of-sale, rather than tax-liability-gated credits. Include passenger vehicles, electric school buses, transit buses, paratransit and accessible vehicles, and medium- and heavy-duty trucks in the program, paired with federal procurement preference and fleet-electrification block grants.
- Pair electric vehicle (EV) buyer incentives with a used-EV credit and dealer-facing sales support to address the supply side of vehicle electrification:
    - Fund a point-of-sale credit for used clean vehicles below a defined price cap, available as direct pay regardless of tax liability.
    - Establish a per-vehicle dealer incentive tied to completed EV sales, so that dealers profit from moving clean vehicles.
    - Support dealer readiness through federal cost-sharing for technician certification, charging and service equipment, and sales training.
- Integrate incentives and grants to help households invest in vehicle-to-grid (V2G) and vehicle-to-home (V2H) capabilities so that consumers' vehicles also serve as resilient backup power.[132]
- Establish a federal EV-charging policy framework to:
    - Create a federal charging reliability and transparency standard, extending the minimum uptime and interoperability rules already applied to National Electric Vehicle Infrastructure (NEVI)-funded stations to any charger built, financed, or subsidized with federal dollars. Require each to meet minimum uptime thresholds; accept universal payment without a proprietary app or membership; and report location, price, plug type, and real-time operating status through a free, open, standardized public data feed available to every mapping and navigation service, so that a consumer knows before leaving home that a working charger is waiting.
    - Condition federal funding for newly constructed parking at specified federally supported projects on infrastructure that is at least EV-capable, with defined shares EV-ready and charger-installed, and automatic load management expressly permitted so that compliance does not require costly panel and service upsizing, applicable to projects initiated after a defined effective date. Specified federally supported projects include federally subsidized housing, federal facilities, federally funded transit hubs, federal highway rest areas, and federally backed multifamily and commercial development.
    - Require that retrofits of existing federally supported parking meet phased EV-capable and EV-ready shares tied to renovation cycles, utilization data, or funding events, so that obligations attach when capital is already being spent.
- Require federally supported major transportation projects in low-income, rural, and Tribal communities to operate under formal co-governance arrangements that include early-phase community engagement, binding consultation with affected residents, anti-displacement protections for households and small businesses, local hire and local contracting floors, and community benefits agreements with measurable outcomes, ensuring that consumers most affected by projects share meaningfully in their economic benefits.
- Authorize and finance a federal High-Performance Rail Network program, comparable in ambition to the Interstate Highway System, for a defined set of intercity high-performance and conventional passenger rail corridors, including full Northeast Corridor reauthorization, completion of designated regional corridors, grade-crossing safety upgrades, and integration with airports, intercity bus, and transit hubs. Pair the program with expanded freight rail capacity that shifts ton-miles off congested highways, reduces emissions per ton-mile, and strengthens supply chain resilience for consumers.
- Require and support standardized procurement across federally backed infrastructure and transportation loan and grant programs, enabling bulk federal purchasing or coordinated multi-agency procurement of common rolling stock such as transit buses and railcars, so that state and local agencies capture the pricing, delivery, and standardization benefits of aggregated national demand rather than each negotiating alone, lowering the capital costs that riders and local taxpayers repay.

[132] Additional recommendations for V2G and V2H capabilities can be found in Chapter 5: Cheap, Abundant, and Clean American Energy for All.

## The EPA reports that transportation was the largest emitting economic sector of GHG emissions in 2023.




OVER

**94% OF TRANSPORTATION FUEL IS PETROLEUM-BASED**

That dependence is a direct household exposure. When war disrupted the Strait of Hormuz in 2026, EIA weekly data show the national average price of regular gasoline rose roughly one dollar per gallon within a month.



## Policy Context:

Surface transportation produces consumer-facing costs across three dimensions: emissions, safety, and operating burden. The EPA reports that transportation accounted for 29.4% of total U.S. GHG emissions in 2023, making it the largest-emitting economic sector, ahead of electric power at 23.5%, with over 94% of transportation fuel petroleum-based.[133,134] That dependence is a direct household exposure. When war disrupted the Strait of Hormuz in 2026, EIA weekly data showed that the national average price of regular gasoline rose roughly one dollar per gallon within a month.[135] Every recommendation in this section that gives a household a way to move without petroleum, from direct-pay clean vehicle credits to reliable charging to transit and rail, is therefore energy security policy as much as affordability policy. **GAO HAS CONFIRMED THAT THE TRANSPORTATION SECTOR IS THE LARGEST SOURCE OF U.S. GHG EMISSIONS AND HAS FOUND THAT STATE AND LOCAL AGENCIES FACE CHALLENGES QUANTIFYING THE EMISSIONS EFFECTS OF TRANSPORTATION INVESTMENTS AND INCENTIVIZING CLEANER CHOICES, INDICATING A CLEAR FEDERAL COORDINATION ROLE.[136]**

On safety, the National Highway Traffic Safety Administration (NHTSA) reported more than 40,000 traffic fatalities in 2023, including 7,314 pedestrians, well above pre-pandemic levels.[137,138] Together, a direct-pay clean vehicle and fleet program, EV-charging framework, co-governance on major projects, and U.S. High-Performance Rail Network can replace today's incrementalist approach. This comprehensive approach will stand as a federal commitment that delivers measurable reductions in household fuel and maintenance costs, prevents avoidable deaths and injuries, improves health, and secures U.S. industrial leadership in clean vehicles, batteries, charging, and rail.

[133] United States Environmental Protection Agency. (2025). *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2023*, EPA 430-R-25-003, Executive Summary. https://library.edf.org/AssetLink/lho850vn3sgns65501wj6dleypl0o477.pdf. Note: EPA finalized this inventory, the first in nearly three decades not publicly released by the agency, and it became public in May 2025 through a Freedom of Information Act request; the citation is to the EPA document as released.

[134] Petroleum share of transportation fuel from: United States Environmental Protection Agency. (2026, May). *Fast Facts on Transportation Greenhouse Gas Emissions*. https://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions.

[135] United States Energy Information Administration. (2026, February.) *Weekly U.S. Regular All Formulations Retail Gasoline Prices*. https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EMM_EPMR_PTE_NUS_DPG&f=W.

[136] United States Government Accountability Office. (2023, August). *Climate Change: State and Local Efforts to Reduce Greenhouse Gas Emissions from Vehicles*, GAO-23-106022. https://www.gao.gov/products/gao-23-106022.

[137] National Highway Traffic Safety Administration. (2025, October). *Summary of Motor Vehicle Traffic Crashes: 2023 Data*, DOT HS 813 762. https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813762.

[138] National Highway Traffic Safety Administration. (2025, June). *Traffic Safety Facts 2023 Data: Pedestrians*, DOT HS 813 727. https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813727. A total of 40,901 people died in U.S. motor vehicle traffic crashes in 2023, including 7,314 pedestrians.

**Challenge – Aging, climate-exposed, and polluting maritime infrastructure that raises costs:** U.S. ports, shipping terminals, container facilities, inland waterways, ferries, and port-connecting rail and truck infrastructure are aging; increasingly exposed to coastal flooding, sea level rise, and storm damage; and remain a significant source of local air pollution and emissions, threatening reliable trade flows, coastal economies, and consumer prices on the goods that move through these systems.

## Policy Options:

- Direct federal port funding toward climate-resilient, low-emissions port modernization that reduces flood and storm risk and electrifies equipment and operations. Require federally funded port projects to assess and mitigate the risk that flooding, storm surge, and sea level rise will remobilize contamination from adjacent Superfund, brownfield, and legacy landfill sites, in coordination with EPA cleanup programs. Ensure that port modernization protects rather than threatens the health of port-adjacent communities, and strengthens the safe, efficient movement of goods through the U.S. supply chain.
- Condition federal support for shipping terminal upgrades on adoption of resilient design, zero- and low-emissions equipment, electrical hookups that allow vessels to shut down diesel engines while docked, and operational improvements that cut pollution, energy use, and disruption risk.
- Expand federal grants and tax incentives for container facilities that deploy electrified cargo-handling equipment, resilient backup power, stormwater and flood protections, and emissions-reducing logistics technologies, lowering goods-movement costs and improving air quality in port-adjacent communities.
- Increase investment in USACE inland waterway construction and major rehabilitation projects, including locks, dams, and navigation systems, while requiring that all federally funded projects incorporate forward-looking climate and hydrological risk projections into design standards both to improve system reliability and to reduce freight emissions per ton-mile, supporting agricultural, energy, and manufacturing supply chains that depend on the inland waterway system.
- Accelerate the deployment of clean, resilient ferries and passenger vessels through federal financing, procurement, and infrastructure support, including vessel electrification, charging, shore power, and hardened terminals, thereby protecting coastal and island passengers who depend on ferry service for daily mobility.
- Prioritize federal investment for resilient port-rail and truck connections that reduce congestion, shift freight to lower-emissions modes where appropriate, and protect critical freight access from flooding, heat, and other climate disruptions, recognizing that the value of port investment depends on the reliability of the corridors that connect ports to markets.
- Authorize a dedicated federal loan program for port and airport decarbonization, structured on the RRIF and TIFIA model and administered through DOT's Build America Bureau, to finance large multimodal emissions-reduction and resilience projects, including terminal electrification, shore power, hydrogen and clean fuel infrastructure, and hardened power systems, that are too large for existing grant programs and too early for private capital to underwrite at scale, lowering the goods-movement and travel costs that consumers ultimately pay.

## Policy Context:

Maritime infrastructure is a cornerstone of national resilience, ensuring reliable trade flows, disaster response capacity, and protection of coastal economies in a changing climate. In the context of offshore wind and other technologies in development stages, ports also serve as a critical gateway to achieving cheap, clean, and reliable U.S. energy. Disruptions in port operations, inland waterway commerce, or port-connecting freight corridors directly impact consumer prices and small-business viability. NOAA's billion-dollar disasters database shows tropical cyclones, severe storms, and coastal flooding among the most frequent and costly U.S. disaster categories, with hurricanes alone responsible for over $1.5 trillion in inflation-adjusted damages since 1980, much of it concentrated along coastlines and goods-movement corridors.[139] The 2026 disruption of the Strait of Hormuz, through which oil equal to roughly 20% of global consumption normally flows, shows how a single chokepoint reaches American consumers through freight rates, war-risk insurance premiums, and fuel prices, underscoring that resilient ports, inland waterways, and diversified domestic energy are consumer-protection infrastructure.[140,141]

Port districts also concentrate legacy contamination alongside the neighborhoods that already bear the heaviest pollution burdens. GAO has found that about 60% of nonfederal Superfund sites are located in areas that may be affected by flooding, storm surge, wildfire, or sea level rise, and that nearly 100 sites will be inundated by just one foot of sea level rise. When floodwaters move through contaminated port lands, the costs arrive as illness, property damage, and lost livelihoods in the communities least able to absorb them.[142] Modernizing ports, terminals, container facilities, inland waterways, ferries, and freight connections to be cleaner, more resilient, and more efficient will lower goods-movement costs that consumers ultimately pay, improve air quality in port-adjacent neighborhoods, supports U.S. competitiveness in maritime trade, and create skilled, well-paying jobs in maritime construction, operations, and maintenance.

[139] National Oceanic and Atmospheric Administration. (2026, April). *U.S. Billion-Dollar Weather and Climate Disasters*. https://www.climatecentral.org/climate-services/billion-dollar-disasters.

[140] United States Energy Information Administration. (2025, June). *Amid Regional Conflict, the Strait of Hormuz Remains Critical Oil Chokepoint*. https://www.eia.gov/todayinenergy/detail.php?id=65504.

[141] Brown, P., Ratner, M., Rosen, L., & Thomas, C. (2019, November). *Iran Conflict and the Strait of Hormuz: Impacts on Oil, Gas, and Other Commodities*, R45281. Congressional Research Service. https://www.congress.gov/crs-product/R45281.

[142] United States Government Accountability Office. (2019, October). *Superfund: EPA Should Take Additional Actions to Manage Risks from Climate Change*, GAO-20-73. https://www.gao.gov/products/gao-20-73.

**Challenge – Strained aviation infrastructure that drives delays, higher fares, and weaker regional connectivity:** U.S. aviation infrastructure is straining under growing demand, aging airport facilities, climate-driven disruptions, an outdated air traffic management system, and the need to cut emissions and noise, all of which translate into delays, higher consumer costs, supply chain bottlenecks, and weakened regional connectivity, especially for rural and underserved communities.

## Policy Options:

- Fully fund and modernize the Airport Improvement Program (AIP) to prioritize climate-resilient, energy-efficient, and low-emissions airport infrastructure, including terminal upgrades, airfield improvements, electrification, and storm hardening, with priority for projects that reduce delays and protect passenger and cargo continuity during extreme events.
- Reform and stabilize the Essential Air Service (EAS) program to preserve reliable regional connectivity for rural and underserved communities while encouraging efficient aircraft, cleaner fuels, and resilient airport systems that lower long-term operating costs.
- Significantly expand federal investment in resilient air cargo and supply chain logistics infrastructure to reduce bottlenecks, strengthen disaster response capacity, and support more efficient, lower-emissions freight movement, with attention to integration between airports, surface freight, and ports.
- Require federally supported aviation infrastructure projects to incorporate forward-looking climate risk, extreme weather, and disaster resilience standards in siting, design, construction, and rehabilitation.
- Expand and better target federal incentives, procurement, and infrastructure support to accelerate sustainable aviation fuel (SAF) production and deployment in ways that deliver real lifecycle emissions reductions, strengthen domestic supply chains, and protect sustainability outcomes.
- Extend the dedicated port and airport decarbonization loan program described in the maritime section of this benchmark to include airport electrification, gate and ground-support equipment conversion, clean fuel storage and delivery infrastructure, and resilient on-site power, giving airport sponsors a low-cost financing pathway for projects that reduce emissions, cut operating costs reflected in fares, and keep facilities operating during grid disruptions.
- Increase federal research, development, demonstration, and commercialization support for advanced aircraft and propulsion technologies, including hybrid-electric, electric, and hydrogen propulsion systems, that cut emissions, improve efficiency, and strengthen U.S. industrial leadership in aerospace.
- Direct the Federal Aviation Administration's (FAA) new Airspace Modernization Office to develop and execute a time-bound, performance-benchmarked plan for the next generation of air traffic management infrastructure, with explicit requirements to reduce per-flight fuel burn and emissions, integrate low-emissions aviation technologies, and maintain cybersecurity and resilience standards. Require annual progress reporting to Congress against those benchmarks.
- Strengthen the FAA controller and aviation workforce pipeline by expanding FAA Academy throughput capacity, protecting hiring and training programs from federal funding disruptions through mandatory advance appropriations, and scaling partnerships with colleges, universities, and apprenticeship programs to build a durable, diverse workforce for next-generation aviation systems.
- Require U.S. airlines to use a robust, trusted, and effective carbon credit system to ensure transparency to passengers and consistency with best industry practices.

## Policy Context:

Aviation infrastructure underpins regional mobility, national security, business and personal travel, and supply chain resilience. Aging airport facilities, climate stress, and an outdated air traffic management system increase delays, cancellations, and fuel burn, all of which translate into higher consumer fares, lower reliability for rural communities served by EAS, and weaker U.S. competitiveness against modernizing aviation systems abroad. Aviation accounts for a growing share of transportation-sector GHG emissions, making cleaner fuels, advanced propulsion, and operational efficiency essential to long-term cost containment and environmental performance. Modernizing the AIP, stabilizing EAS, hardening federally supported aviation infrastructure to forward-looking climate risk, scaling SAF and advanced propulsion, modernizing air traffic management, and investing in aviation workforce and manufacturing will together protect passengers and shippers, supports rural and regional economies, and reinforces U.S. leadership in a high-value strategic industry.

BENCHMARK #3.4:

# Land use and development decisions reflect current and future risk, guiding growth to safer, more resilient places.

**THE FEDERAL GOVERNMENT IS THE NATION'S LARGEST LAND MANAGER, AND ON PUBLIC LANDS ITS AGENCIES CARRY OUT EXTENSIVE, STATUTORILY REQUIRED LAND USE PLANNING UNDER LAWS SUCH AS *THE FEDERAL LAND POLICY AND MANAGEMENT ACT* AND *THE NATIONAL FOREST MANAGEMENT ACT*.** But on the private, state, and local lands where most Americans live and build, the federal government does not plan; it pays, finances, insures, and permits. There, its policies too often fail to reward smart state and local land use decisions that steer growth away from rising climate risks and toward safer, better-served, more resilient places. Without stronger federal incentives, planning support, and market signals, public and private investment continues to reinforce unsafe development patterns, increasing long-term disaster costs, housing instability, and fiscal strain on consumers, taxpayers, and local governments. The recommendations below convert the federal posture from passive subsidizer to active steward, channeling federal dollars and authorities toward growth that protects households, lowers public and private costs, and supports durable economic competitiveness. This section provides policy options for three key challenges:

1. Federal dollars that flow to the riskiest places
2. Limited state and local planning capacity
3. Hidden climate risk



**Challenge – Federal dollars that flow to the riskiest places:** Federal infrastructure, housing, mortgage finance, and disaster dollars too often subsidize new development in places that science and lived experience already show to be the riskiest. This locks households, taxpayers, and local governments into avoidable losses, repeated rebuilding, and rising insurance and disaster recovery costs. Federal policy must meet people where they are, by treating transition support not as a bureaucratic transaction but as an obligation to communities whose vulnerability is largely the result of decisions far outside their control. Federal policy can and should help communities channel growth toward safer, infrastructure-served places where consumers gain durable affordability, communities attract investment, and federal dollars produce long-term returns rather than repeat losses.

## Policy Options:

- Establish a single, coherent federal eligibility framework so that federal authorities do not subsidize the riskiest places:
  - Condition federal permitting and infrastructure, housing, community development, and disaster dollars on state and local adoption of risk-informed land use policies.
  - Make new development in federally designated extreme-risk areas – including severe wildfire hazard zones, federally designated flood hazard areas, areas projected to be inundated by sea level rise, and repetitive-flood-loss locations – ineligible for federal funding, federal permitting, and federally backed mortgages.
  - Pair the standard with clear, time-bound transition support so that consumers, builders, and local governments can plan against a stable federal signal.
- Strengthen today's minimum federal floodplain management standards and convert them into a meaningful federal floor that incorporates forward-looking precipitation, sea level rise, pluvial (rainfall-driven) flood risk, and future hazard conditions into baseline requirements. Modernize NFIP flood maps on a defined update cycle to include future conditions and pluvial flood mapping, reform the Community Rating System to better reflect coastal and sea level rise risk, and steer federally backed development away from coastal areas expected to be inundated by sea level rise.
- Operate a flagship federal incentive as a National Safe Growth Bonus to:
  - Channel infill, redevelopment, and gentle density into lower-risk places already served by existing water, sewer, energy, and proximal public transit infrastructure.
  - Combine the bonus with federal financing for site assembly, brownfield redevelopment, accessory dwelling units, and missing-middle housing with anti-displacement protections, local hire and contracting floors, and explicit affordability requirements, ensuring that lower-income consumers share in the resilience and affordability gains rather than being priced out of safer places.
  - Leverage the Build Now provisions of the *21st Century ROAD to Housing Act*, which tie CDBG funding to housing production, adding the risk dimension that law omits: weight federally credited production toward lower-risk, infrastructure-served locations, both so that a home permitted in a safe, served neighborhood counts for more than a home permitted in the floodplain or the wildland-urban interface (WUI) – the area where human development meets undeveloped wildland – and so that no jurisdiction can satisfy federal production benchmarks by building in harm's way.
- Improve the Community Disaster Resilience Zones (CDRZ) program to integrate community-identified resilience stressors and priorities, vulnerability indicators, and expected loss.
- Establish a permanent, federally led voluntary climate relocation program that consolidates the current fragmented patchwork of FEMA, HUD, the U.S. Department of the Interior (DOI), USDA, and other agency programs to fund full-cycle community transitions. This should include:
  - Planning and buyouts in high-risk origin communities, and housing, infrastructure, and essential services capacity in the lower-risk receiving communities where households and businesses resettle.
  - Fiscal transition support for origin communities as populations decline, including federal assistance for infrastructure decommissioning and right-sizing, relief from stranded utility and municipal debt that would otherwise fall on the remaining households least able to leave, and long-term stewardship of acquired land as open space.
  - Time-limited federal revenue transition payments, modeled on Payment in Lieu of Taxes (PILT), for jurisdictions where federally supported buyouts convert taxable property to permanent open space, so that no local government's fiscal survival depends on encouraging households to rebuild in the hazard zone.
  - Ensure the dignity and cultural values, traditions, and practices, as well as social and economic interdependencies that can operate as barriers to the planned transition that is needed before environmental conditions or disaster events spur unplanned or episodic transition.

## One in three American homes now sits in the wildland-urban interface

Homes in the WUI, where development meets flammable wildland vegetation, 1990–2020




**32% of all U.S. housing**

more than 44 million homes as of 2020

2.6 million WUI homes were added from 2010 to 2020 alone

Graphic: SEEC Institute. Source: Understanding the Wildland-Urban Interface (1990–2020). (2023)

## Policy Context:

Federal dollars are flowing into the riskiest places at unprecedented scale. The U.S. Forest Service (USFS) found that, as of 2020, more than 44 million homes, 32% of all U.S. housing, were located in the WUI.[143] The number of WUI homes grew 47% from 1990 to 2020, including 2.6 million homes built between 2010 and 2020 alone, with WUI area expanding by roughly the land area of Washington State.[144]

On flood risk, while GAO found as of 2021 that FEMA's Risk Mapping, Assessment and Planning (Risk MAP) program had improved the currency of its flood maps, the maps it examined did not reflect the best available climate science and did not include information on current flood hazards, including pluvial flooding that overwhelms existing storm drainage systems. As such, the NFIP remained on GAO's High Risk List.[145] The cost of this misalignment is concentrated and rising.

Many communities facing the greatest climate risks have stewarded their land and water for generations. Their resistance to relocation is not a failure of judgment; it reflects the cost of severing cultural traditions, livelihoods, and identities that are inseparable from place. The very concept of *managed retreat* carries painful historical resonance in the United States, evoking a long record of forced displacement of Indigenous peoples, Black communities, and other marginalized groups by the federal government, a history that shapes how federal climate relocation policy is received and whether people and communities trust it.[146] While the social, cultural, and psychological barriers to relocation can be significant, a deliberately planned transition can preserve community networks and culture when communities drive the process themselves, on their own timeline, with genuine resources behind them.[147] **WHATEVER THE LABEL, WHETHER MIGRATION, PLANNED RELOCATION, OR MANAGED RETREAT, THE UNDERLYING FACT IS THE SAME. CLIMATE CHANGE IS MAKING SOME LOCATIONS UNSAFE TO INHABIT AT ANY AFFORDABLE PRICE, AND FEDERAL POLICY THAT ACTS ON THAT FACT EARLY, BEFORE REPEATED LOSSES EXHAUST HOUSEHOLDS AND BUDGETS, WILL COST FAR LESS THAN PERPETUAL PROTECTION OF PLACES THAT CANNOT DURABLY BE PROTECTED.**

A coherent federal posture, eligibility tied to risk-informed land use, a modernized federal floodplain floor, a Safe Growth Bonus for safer places, and a federal architecture for community-led climate migration and receiving communities will form a coordinated consumer-centered framework that lowers long-term federal disaster spending, stabilizes local fiscal health, honors cultural traditions and identities, and supports durable, affordable, infrastructure-served growth.

[143] United States Fire Administration. (2026, May). *What is the WUI?* https://www.usfa.fema.gov/wui/what-is-the-wui/.

[144] United States Department of Agriculture, Forest Service, Northern Research Station. (2023, September). *Understanding the Wildland-Urban Interface (1990–2020)*. https://research.fs.usda.gov/nrs/products/dataandtools/understanding-wildland-urban-interface-1990-2020-storymap.

[145] United States Government Accountability Office. (2021, October). *FEMA Flood Maps: Better Planning and Analysis Needed to Address Current and Future Flood Hazards*, GAO-22-104079. https://www.gao.gov/products/gao-22-104079.

[146] Baja, K. (2021). Rethinking Process and Reframing Language for Climate-Induced Relocation. In *Global Views on Climate Relocation and Social Justice*. https://www.taylorfrancis.com/chapters/edit/10.4324/9781003141457-2/rethinking-process-reframing-language-climate-induced-relocation-kristin-baja.

[147] Mach, K. & Siders, A. (2021, June). Reframing Strategic, Managed Retreat for Transformative Climate Adaptation. *Science 372*(6548). https://doi.org/10.1126/science.abh1894.

**Challenge – Limited state and local planning capacity:** The communities most exposed to climate and disaster risk often have the least capacity to plan, govern, and coordinate the integrated land use, zoning, building code, hazard mitigation, and capital investment decisions that determine whether growth is safe and durable. On top of this, federal programs continue to operate in fragmented silos that make it harder, not easier, for state and local partners to manage risk on behalf of their residents.

## Policy Options:

- Deliver financial and technical assistance through a National Resilient Land Use Capacity Initiative to state offices of resilience, regional planning organizations, MPOs, Tribes, and small, rural, and under-resourced jurisdictions to develop and implement integrated land use plans, comprehensive plans, zoning, building codes, hazard mitigation plans, capital improvement plans, and Community Wildfire Protection Plans (CWPP). Provide multi-year staff funding, modern data and modeling tools, peer technical assistance networks, and dedicated support for jurisdictions with limited planning staff capacity through the initiative, recognizing that the federal government's most cost-effective resilience investment is often in the planning capacity of front-line communities.
- Establish a unified "One Plan" Climate Risk Integration Standard to:
  - Condition federal approval of any development-related plan on the incorporation of forward-looking climate conditions and future hazard projections.
  - Integrate housing, transportation, environment, public health, energy, water, and emergency management considerations into a coherent whole.
  - Require review by a coordinated federal interagency body rather than by separate, fragmented programs.[148]
  - Pair with federal technical assistance and model plan templates so that jurisdictions are not left to interpret federal requirements alone.
- Codify cross-agency coordination among HUD, DOT, EPA, FEMA, USDA, NOAA, the Treasury Department, and federal financial regulators around shared resilience goals, harmonized data and risk standards, common federal application and reporting requirements, and a single national resilience strategy, ending the situation where consumers, applicants, and local governments must navigate dozens of disconnected federal programs to assemble a single resilience project. Coordinate and reinforce the national resilience strategy called for in this chapter, and Chapter 9: Government that Delivers through a Federal Cross-Agency Resilience Coordination Authority.
- Establish a federal Community Engagement and Anti-Displacement Standard, converting today's checkbox consultation process into a genuine federal floor without creating new avenues for project delay, by requiring:
  - All federally supported land use, resilience, and infrastructure planning to include meaningful, well-resourced, early-phase stakeholder engagement with documented agency response.
  - Structured consultation with directly affected residents and businesses with defined timelines.
  - Anti-displacement protections enforceable as conditions of federal funding and built on the *Uniform Relocation Assistance Act* and Section 104(d) of the *Housing and Community Development Act*. These protections included timely relocation assistance, one-for-one replacement of demolished or converted affordable units, right-to-return preferences, and relocation support for households and small businesses in project-adjacent areas.
- Require federal agencies to plan for and fund receiving communities as part of any federally supported climate relocation or managed retreat program, ensuring that housing supply, infrastructure, schools, essential community services, and workforce development capacity are in place in lower-risk destination communities before, not after, households and businesses are asked to move.

## Policy Context:

The federal government is the nation's most experienced land use planner, and that expertise is deployable. CWPPs under the *Healthy Forests Restoration Act* already demonstrate the model, with federal land management agencies planning jointly with the communities on their boundaries. A federal capacity initiative can extend that precedent beyond wildfire, putting decades of federal planning practice, data, and staff expertise to work for the neighboring jurisdictions that have none. GAO has found that unclear federal leadership is the key challenge to climate migration as a resilience strategy and that federal programs are generally not designed to address the scale and complexity of community relocation, recommending a federally led pilot program with clear federal leadership.[149]

The same fragmentation problem extends to broader resilience planning as small, rural, Tribal, and historically underserved communities often lack the staff and tools to compete for federal funds, even when they are most exposed to risk. A National Resilient Land Use Capacity Initiative, a "One Plan" climate risk integration standard, codified federal cross-agency coordination, and a community-centered, receiving-community-aware planning standard together will convert federal land use policy from a series of disconnected funding lines into a coherent system that protects consumers, lowers federal disaster spending, and enables every community, not only the best-resourced ones, to plan a safer, more affordable future.

[148] These should include FEMA Hazard Mitigation Plans, HUD Consolidated Plans and the range of fair housing plans, DOT statewide transportation improvement plans, asset management plans, and public transportation safety plans, and EPA plans required under the range of water program authorities, among others.

[149] United States Government Accountability Office. (2020, July). *Climate Change: A Climate Migration Pilot Program Could Enhance the Nation's Resilience and Reduce Federal Fiscal Exposure*, GAO-20-488. https://www.gao.gov/products/gao-20-488.

**Challenge — Hidden climate risk:** American households and many local officials make some of the largest financial and policy decisions of their lives, such as buying or renting a home, approving a development, or issuing public debt, without standardized, accessible, forward-looking information about climate and disaster risk. At the same time, federally backed mortgage finance, appraisal, and public credit markets continue to operate based on outdated risk assumptions that the historical record reliably predicts future conditions, thus fueling housing instability, fiscal strain, and concentrated losses for the consumers least able to absorb them.

## Policy Options:

- **ESTABLISH A NATIONAL CLIMATE RISK DISCLOSURE STANDARD FOR REAL ESTATE, MODELED ON THE FEDERAL LEAD-PAINT DISCLOSURE, TO PROVIDE EVERY PROSPECTIVE BUYER AND LESSOR BEFORE PURCHASE CONTRACT OR LEASE SIGNING WITH INFORMATION THEY NEED TO MAKE AN INFORMED DECISION BASED ON THEIR INDIVIDUAL RISK TOLERANCE.** Present through the disclosure, in plain language and consistent format nationwide, the property's climate hazards, current and projected future risk under defined scenarios, prior disaster and flood loss history, current insurance coverage and exclusion status, and available federal disaster recovery and mitigation resources.
- Create a new Risk-Aware Federal Capital Markets Framework through federal directives to the Federal Housing Finance Agency (FHFA), Fannie Mae, Freddie Mac, Federal Housing Administration (FHA), U.S. Department of Veterans Affairs (VA), USDA Rural Development (RD), federal banking regulators, federal appraisal standards, and federally backed municipal credit support to require the incorporation of forward-looking climate risk in underwriting, appraisal, scenario analysis, and stress testing. Include in the framework strong consumer protections against discriminatory pricing, premium assistance for under-resourced and underserved households facing transition costs, and explicit guardrails to ensure that risk-aware capital markets do not become an instrument of redlining.
- Operate a single, federally backed, open-source, plain-language national climate risk data and tools service to integrate NOAA, USGS, FEMA, USFS, USGCRP, and other federal data into decision-ready products for households, real estate professionals, lenders, insurers, and local officials. Make this single, trusted, authoritative, federal reference available without subscription or paywall to inform disclosures, underwriting, appraisal, planning, and household decisions on common terms.
- Launch a new Climate Risk Literacy Initiative with sustained federal investment to deliver plain-language consumer education tools through trusted information channels, including community-based organizations, public housing counseling agencies, library systems, and Cooperative Extension Service networks. Provide dedicated training for local officials, real estate professionals, lenders, and appraisers on how risk affects long-term affordability, household financial stability, and local fiscal health. Ensure through the initiative that the disclosure, capital markets, and data reforms above are matched by the consumer and institutional knowledge needed to act on them.

## Policy Context:

Information asymmetry between consumers and the housing and capital markets they participate in is one of the largest hidden costs of today's federal land use posture. GAO documented in 2021 that even though FEMA had improved flood map currency, its maps still do not reflect the best available climate science and do not include current flood hazards from heavy rainfall, undermining the very foundation on which lenders, insurers, real estate professionals, and local officials make risk-informed decisions.[150] Federal land and science agencies already produce much of the nation's foundational hazard data, from the USFS's Wildfire Risk to Communities assessments to USGS and NOAA hazard mapping, but it reaches consumers, lenders, and local officials unevenly and on no common standard. An open national climate risk data service will consolidate what taxpayers have already paid to create.

Furthermore, FIO found that homeowners insurance is becoming more costly and harder to procure in climate-exposed regions, with rising non-renewals a leading indicator of broader housing-market and mortgage-market stress.[151] The Senate Budget Committee investigated the systemic economic risks that climate poses to housing and insurance markets and concluded that climate change is the primary driver of rising non-renewal rates, particularly in areas exposed to wildfires, hurricanes, and severe storms.[152] **A NATIONAL REAL ESTATE DISCLOSURE STANDARD, A RISK-AWARE FEDERAL CAPITAL MARKETS FRAMEWORK, AN OPEN NATIONAL CLIMATE RISK DATA SERVICE, AND A FEDERAL CLIMATE RISK LITERACY INITIATIVE TOGETHER WILL GIVE CONSUMERS, LENDERS, LOCAL OFFICIALS, AND CAPITAL MARKETS THE SAME ACCURATE, FORWARD-LOOKING INFORMATION, ENDING THE FEDERAL PRACTICE OF PRICING YESTERDAY'S RISK INTO TODAY'S HOUSING MARKET AND SUPPORTING DURABLE HOUSEHOLD AFFORDABILITY, MORTGAGE MARKET STABILITY, AND LOCAL FISCAL HEALTH.** The land use, planning capacity, and risk disclosure solutions in this benchmark depend, ultimately, on the federal governance architecture called for in Chapter 9: Government that Delivers, and include a national resilience strategy, codified cross-agency coordination, and meaningful state, Tribal, and local leadership, without which even the strongest individual federal programs will continue to operate as disconnected interventions rather than a coherent system.

[150] United States Government Accountability Office. (2021, October). *FEMA Flood Maps: Better Planning and Analysis Needed to Address Current and Future Flood Hazards*, GAO-22-104079. https://www.gao.gov/products/gao-22-104079.

[151] United States Department of the Treasury, Federal Insurance Office. (2025, January). *Analyses of U.S. Homeowners Insurance Markets, 2018–2022: Climate-Related Risks and Other Factors.* https://climateriskadvisors.com/resources/analyses-us-homeowners-insurance-markets-2018-2022.pdf.

[152] United States Senate Committee on the Budget. (2024, December). *Next to Fall: The Climate-Driven Insurance Crisis is Here—And Getting Worse.* https://www.budget.senate.gov/imo/media/doc/next_to_fall_the_climate-driven_insurance_crisis_is_here__and_getting_worse.pdf.

**BENCHMARK #3.5:**

# Disaster recovery is fast, community-centered, consistent, and focused on building a better future.

**WHEN DISASTERS STRIKE, FEDERAL POLICY MEETS SURVIVORS AT THE WORST MOMENT OF THEIR LIVES.** Federal assistance must arrive quickly, work the way survivors live, and make every recovery dollar a down payment on long-term risk reduction rather than the next disaster's losses. This benchmark embodies the principle that disasters are "locally executed, state or tribally managed, and federally supported"[153] through accelerated and performance-based response, mitigation, and preparedness grants.[154]

Without nimble, survivor-centered federal policies that reduce administrative burdens and align recovery dollars with long-term outcomes, disasters continue to trigger prolonged displacement, deeper financial hardship, and repeated losses. Durable community resilience also requires the whole-of-government national resilience strategy called for in Chapter 9: Government that Delivers. The recommendations below establish the survivor-centered, consumer-protective foundation on which that broader strategy rests. This section provides policy options for five key challenges:

1. Reactive, supplemental-driven disaster spending
2. Fragmented federal programs impossible to navigate in crisis
3. Concentrated, repetitive disaster losses
4. Federal recovery dollars that rebuild yesterday's vulnerabilities
5. Lifeline failures that strand the survivors



[153] The President's Council to Assess the Federal Emergency Management Agency. (2026, May). *Final Report*. https://www.dhs.gov/sites/default/files/2026-05/26_0507_fema%20review%20council_final%20report.pdf.

[154] Horn, D., Lee, E., & Webster, E. (2026, May). *FEMA Review Council: Final Report*, IN12693. Congressional Research Service. https://www.congress.gov/crs-product/IN12693.

**Challenge – Reactive, supplemental-driven disaster spending:** Federal disaster spending continues to grow primarily through after-the-fact supplemental appropriations optimized for electoral politics and reactive recovery programs that arrive after damage is done, rather than through pre-disaster mitigation that prevents losses, lowers consumer costs, centers on survivors, and protects taxpayers. Federal disaster policy can deliver more predictable, more cost-effective protection for households and communities by investing in resilience before disasters strike and by streamlining the recovery programs survivors must rely on when disasters do hit.

## Policy Options:

- **REESTABLISH FEMA AS AN INDEPENDENT, CABINET-LEVEL AGENCY REPORTING DIRECTLY TO THE PRESIDENT, WITH A SENATE-CONFIRMED ADMINISTRATOR AND DEPUTY ADMINISTRATOR AND A DEDICATED INSPECTOR GENERAL (IG), RESTORING THE VISIBILITY, AUTHORITY, ACCOUNTABILITY, AND DIRECT WHITE HOUSE LINE NECESSARY TO LEAD A MODERN FEDERAL DISASTER SYSTEM.** Create statutory workforce readiness benchmarks, including field staffing and rural service capacity, reported publicly so that efficiency initiatives cannot hollow out the frontline workforce that disasters require.
- Shift the federal disaster-spending ratio from post-disaster recovery toward pre-disaster mitigation, prioritizing housing and infrastructure at greatest risk and areas settled prior to modern understanding of hazards and climate impacts. Drive the shift through two reinforcing funding streams: first, predictable, annually appropriated hazard mitigation funding that does not depend on disasters occurring, and second, a dedicated mitigation set-aside in every disaster supplemental appropriation, structured so that each federal dollar appropriated for disaster recovery triggers an additional dollar for hazard mitigation.
- Direct FEMA to develop victim-centered, trauma-informed policies that address the unique risks to vulnerable populations, including children, the unhoused, people with disabilities, and people experiencing gender-based violence and human trafficking.
- Streamline federal recovery programs across all departments and agencies to reduce delays and administrative complexity by leveraging pre-approved Hazard Mitigation Plans as intended by the *Disaster Mitigation Act*, as well as by increasing use of estimate-based funding. Transition public and nonprofit facility recovery toward an expedited, estimate-based model that funds the repair, restoration, or replacement of damaged facilities up front rather than reimbursing line-item documentation after the fact.
- Revise FEMA's Emergency Management Performance Grant (EMPG) cost-share requirements to waive or reduce the nonfederal cost share for qualifying disadvantaged communities.
- Provide permanent statutory authorization for the HUD CDBG-DR program, including its own administrative framework, allocation formula, and timelines, replacing the current case-by-case supplemental appropriation model and giving consumers, communities, and program staff a stable framework against which to plan.
- Include slow-onset hazards like permafrost thaw and subsidence losses among the hazards considered for eligibility under the *Stafford Act*.
- Authorize flexible use of federal recovery funds, including FEMA Public Assistance, FEMA Individual Assistance, HMGP, FMA, and HUD CDBG-DR/CDBG-MIT, for voluntary buyouts, full relocation cost assistance, replacement housing, community-led redevelopment, and origin- and receiving-community planning.
- Direct the USFS, National Park Service (NPS), and Bureau of Land Management (BLM) to establish a streamlined, presumptively approved right-of-entry for state and local governments to install, operate, and maintain flood, fire, and extreme weather monitoring equipment, including stream gauges, rain gauges, and weather sensors, on federal lands where such equipment serves public safety functions.
- Enact a Federal Resilience Funds Delivery Standard so that money Congress appropriates reaches communities on Congress's schedule, not the executive's discretion, including:
  - Statutory obligation and disbursement deadlines for every federal resilience, mitigation, and clean energy program, with appropriation-to-obligation-to-outlay performance published on a public dashboard.
  - Formula and block delivery as the default where speed matters most, with both milestone-based advance payment replacing after-the-fact reimbursement and working-capital advances for under-resourced jurisdictions that cannot float federal receivables.
  - Direct federal application pathways for local governments and Tribes alongside state-administered channels, and, where states administer funds, statutory suballocation deadlines, published accounting of the share reaching local governments, and required local consultation in state spending plans.
  - Self-executing protections against withholding, including funds deemed apportioned when the Office of Management and Budget (OMB) misses statutory apportionment deadlines, automatic release of formula funds on the statutory schedule, expedited judicial review with a private right of action for grantees whose awarded funds are withheld, and a prohibition on attaching conditions to awarded grants beyond those in statute.
  - Statutory processing deadlines with *Prompt Payment Act*-style interest owed to communities when the federal government pays late.

- Establish an independent National Disaster Safety Board, modeled on the National Transportation Safety Board (NTSB), to:
  - Investigate the underlying causes of fatalities, injuries, and property damage resulting from major natural disasters, and issue public, fact-based recommendations to federal, state, Tribal, territorial, and local governments on how to prevent the same losses from recurring.
  - Operate the Board with structural independence from FEMA and other agencies whose performance it may review. Staff it with credentialed experts in emergency management, public health, engineering, building science, social and behavioral sciences, climate and weather, and consumer protection. Include a dedicated office focused on disaster impacts on low-income households, communities of color, seniors, people with disabilities, rural and Tribal communities, and other populations bearing disproportionate disaster harm.
  - Empower the Board to obtain testimony as part of investigations, issue public-facing reports after each investigated event, maintain a public, searchable database of recommendations and their implementation status, and provide technical assistance to jurisdictions working to act on its findings. In this way, an independent National Disaster Safety Board can serve as a single, authoritative, consumer-protective learning system that turns each disaster into durable national risk reduction.

## Policy Context:

Federal disaster spending has shifted increasingly to large after-the-fact supplemental appropriations rather than predictable pre-disaster mitigation. The Congressional Budget Office (CBO) reported that over the 1992–2021 period, budget authority appropriated for the Disaster Relief Fund (DRF) totaled $381 billion ($469 billion in 2022 dollars), with nearly three-quarters provided through supplemental appropriations.[155] FY2025 alone required approximately $51.5 billion in combined DRF appropriations.[156,157,158] Even at that historic level, the Congressional Research Service (CRS) reported that at the beginning of every fiscal year since FY2023, FEMA projected that available DRF resources would be inadequate to pay the year's major disaster costs.[159]

GAO has placed improving the delivery of federal disaster assistance on its High Risk List, reflecting persistent, government-wide challenges that put both federal dollars and disaster survivors at significant risk.[160] This reactive posture is not accidental. Economic research has found that nearly half of all disaster relief may be motivated politically rather than by need, with states politically important to the president receiving more declarations and higher recovery spending.[161,162,163] The result is a federal disaster system that is financially unsustainable, inequitably distributed, and designed more around political incentives than community need.

The President's FEMA Review Council issued its final report in May 2026, recommending parametric block grants in place of the Public Assistance program, a single consolidated survivor payment, and higher disaster declaration thresholds. CRS notes that its most consequential recommendations require acts of Congress.[164,165] The policy options in this benchmark share the Council's diagnosis that recovery is too slow, too complex, and too paperwork-bound and will supply what its proposals leave unresolved: survivor-centered eligibility, accountability for outcomes, and a federal partner strong enough to deliver when states are overwhelmed. A timely delivery standard with deemed-apportionment rules, automatic formula releases, and expedited judicial review will ensure congressional appropriations are not an opening position in a negotiation with the executive but rather what the Constitution intends them to be: a decision. Restoring FEMA as a cabinet-level agency, shifting the federal dollar ratio toward pre-disaster mitigation, streamlining recovery through estimate-based funding and pre-approved mitigation plans, permanently authorizing CDBG-DR, and enabling flexible use of recovery funds for community-led relocation and redevelopment together will provide a predictable, consumer-protective system that will lower long-term federal costs and accelerates the return of communities to economic stability.

[155] Congressional Budget Office. (2022, October). *FEMA's Disaster Relief Fund: Budgetary History and Projections.* https://www.cbo.gov/publication/58840.

[156] Disaster Relief Supplemental Appropriations Act, 2025, Division B of *Pub. L. No. 118-158* (2024, December). https://www.congress.gov/118/plaws/publ158/PLAW-118publ158.pdf.

[157] Full-Year Continuing Appropriations and Extensions Act, 2025, *Pub. L. No. 119-4*. (2025, March). https://www.congress.gov/bill/119th-congress/house-bill/1968/text.

[158] Federal Emergency Management Agency. (2025, September). *Disaster Relief Fund: Monthly Report as of August 31, 2025*. https://www.dhs.gov/sites/default/files/2025-12/25_1022_fema_disaster-relief-fund-fy25-report-as-of-september-2025.pdf. P.L. 118-158 Division B appropriated $29 billion to the DRF; P.L. 119-4 appropriated $22.51 billion in annual DRF funding for FY2025.

[159] Painter, W. (2026, March). *Disaster Relief Fund State of Play: In Brief*, R47676. Congressional Research Service. https://www.congress.gov/crs-product/R47676. CRS reports that at the beginning of every fiscal year since FY2023, FEMA has projected that available resources in the Disaster Relief Fund would be inadequate to pay the year's major disaster costs, even when annual budget requests have been met or exceeded.

[160] United States Government Accountability Office. (2025, February). *High-Risk Series: Heightened Attention Could Save Billions More and Improve Government Efficiency and Effectiveness*, GAO-25-107743. https://www.gao.gov/products/gao-25-107743.

[161] Horn, D. (2025, January). *Post-Disaster and Pre-Disaster Hazard Mitigation Assistance*, IF12833. Congressional Research Service. https://www.congress.gov/crs-product/IF12833.

[162] Garrett, T. & Sobel R. (2003). The Political Economy of FEMA Disaster Payments. *Economic Inquiry* 41(3) (2003). As cited in Arceneaux, K. and Stein, R. (2006). *Who is Held Responsible When Disaster Strikes? Journal of Urban Affairs*. https://onlinelibrary.wiley.com/doi/abs/10.1093/ei/cbg023.

[163] Balbuena, K. et al. (2022). The Disastrous Business of Presidential Campaigns: The effect of disaster declarations on presidential elections in FEMA Region 3. *Journal of Emergency Management* 20(6). https://pubmed.ncbi.nlm.nih.gov/36523196.

[164] The President's Council to Assess the Federal Emergency Management Agency. (2026, May). *Final Report*. https://www.dhs.gov/sites/default/files/2026-05/26_0507_fema%20review%20council_final%20report.pdf.

[165] Horn, D., Lee, E., & Webster, E. (2026, May). *FEMA Review Council: Final Report*, IN12693. Congressional Research Service. https://www.congress.gov/crs-product/IN12693.

**Challenge – Fragmented federal programs impossible to navigate in crisis:** Disaster survivors must navigate more than 30 federal entities and dozens of separate programs at the worst moment of their lives, often without stable housing, identification, internet access, or the documentation those programs demand. Federal communications, eligibility rules, and timelines are not designed around the realities of survivors in crisis. The result is delayed help, denied applications, deeper financial hardship, worsened trauma, mistrust exploited by intentional misinformation campaigns, and unequal outcomes that fall hardest on those least able to absorb them.

## Policy Options:

- **ESTABLISH A SINGLE, WEB-BASED, MOBILE-FRIENDLY FEDERAL UNIFIED DISASTER APPLICATION SYSTEM AS THE FRONT DOOR TO ALL FEDERAL INDIVIDUAL DISASTER AID, ACCESSIBLE TO EVERY SURVIVOR REGARDLESS OF HOW THEY APPLY.**[166] Replace today's siloed forms through a Universal Survivor Application with one application that (with explicit information-sharing authorities among agencies) automatically routes a survivor's information to every federal program for which they may be eligible, ending the practice of forcing survivors to repeatedly retell the worst moments of their lives to disconnected agencies.
- Redesign federal disaster assistance programs around the realities of survivors in crisis by establishing Survivor-Centered Eligibility, Sheltering, and Replacement Standards to minimize displacement and financial hardship for renters, housing cooperatives, and homeowners through eligibility rules and program design:
  - Allow people without fixed addresses to qualify for sheltering assistance.
  - Amend in the *Stafford Act* to codify FEMA's policy of accepting alternative ownership documentation, including heirship affidavits, so that no disaster survivor is denied assistance for lack of a recorded deed and no future administration can reverse the fix.
  - Remove credit card and security deposit requirements for eligible non-congregate sheltering.
  - Authorize federal assistance to replace a home after total loss when this is cheaper than providing temporary units (net of insurance), avoiding the federal practice of paying repeatedly for short-term solutions instead of one durable, dignified one.
  - Create plain-language eligibility communications, simplified appeals, and consistent decision letters.
- Amend the *Stafford Act* so that severe, prolonged wildfire smoke episodes, including transboundary smoke from fires outside U.S. jurisdiction, can qualify for federal emergency assistance, funding clean-air shelters, filtration distribution, and mass care for those impacted by the smoke even if they are without any proximal fire, evacuation order, or declaration.
- Establish a federal Disaster Renter Protection Standard for federally backed, federally insured, and federally assisted rental properties, building on the *Coronavirus Aid, Relief, and Economic Security (CARES) Act's* covered-property framework, that gives tenants and landlords clear, uniform rules when disaster strikes, including the right to terminate a lease without penalty when a unit is rendered uninhabitable, pro-rated rent abatement while a unit cannot be safely occupied, prompt return of security deposits for displaced tenants, protection from eviction during a defined post-disaster recovery period, and defined landlord obligations for repair timelines and tenant communication.
- Guarantee equitable access to recovery resources for marginalized and historically underserved communities through federal recovery programs, including communities of color, low-income households, immigrant households (consistent with statutory eligibility), people with disabilities, seniors, and people living in mixed-status households. Boost technical assistance capacity for rural and economically distressed communities, restore pathways for community-based organizations to apply directly for recovery funds, weigh economically distressed and rural areas more heavily in disaster declarations, and simplify access to pre-disaster and disaster recovery programs.
- Guarantee survivors access to disaster legal assistance through federal policy, including through Legal Services Corporation-funded providers and other legal aid networks, to help survivors navigate disaster recovery, prevent unlawful displacement, resolve insurance and benefits disputes, and stabilize housing and finances after disasters. Hold FEMA, and any other federal agency found liable, responsible for the applicant's attorney fees where appeals are decided in the applicant's favor, ensuring meaningful federal accountability for wrongful denials and giving program applicants a credible remedy when federal programs get it wrong.
- Require FEMA, HUD, the U.S. Small Business Administration (SBA), and other federal agencies that support disaster recovery to develop metrics and measure federal disaster recovery success against long-term outcomes that matter to consumers – households returned to stable housing, household financial stability and credit health restored, displacement avoided, small businesses returned to operation, communities returned to economic vitality, and future disaster losses reducedm – rather than by transactional metrics such as funds obligated or applications closed. Require these agencies to publicly report on these outcomes by community type, including for rural, Tribal, and historically underserved communities, so that consumers, Congress, and the public can hold federal recovery programs accountable for the results they deliver.

[166] Covered systems need to include FEMA Individuals and Households Program, Other Needs Assistance, Disaster Unemployment Assistance, Disaster Legal Services, Disaster Case Management, Crisis Counseling, SBA disaster loans, USDA disaster assistance, HUD-supported housing assistance, and other federal individual aid.

## Policy Context:

Federal disaster recovery is structurally hard for consumers to navigate. More than 30 federal entities are involved in disaster recovery, creating confusing and lengthy processes for survivors and communities least prepared to navigate complex federal programs.[167] From 2016 through 2018, 5.6 million people applied for disaster assistance from FEMA and 4.4 million were referred to the Individuals and Households Program (IHP). Approximately 2.4 million applicants were ultimately determined ineligible, with common reasons for denial including insufficient damage and failure to provide supporting evidence, conditions strongly tied to the realities of survivors in crisis rather than to actual lack of need.[168] Eligibility gaps can be categorical as well as procedural. Smoke is the face of wildfire for the majority of Americans who will never see a flame front. In July 2026, smoke from Canadian fires placed large portions of the Midwest and Northeast under hazardous air quality conditions, prompting a formal EPA statement on cross-border smoke, with no disaster declaration and no federal assistance attached.[169] A Unified Disaster Application System, survivor-centered eligibility and sheltering standards, guaranteed access to resources for underserved, rural, and Tribal survivors, guaranteed legal assistance with federal accountability for wrongful denials, and outcome-based measures of federal recovery success together can replace today's federal-program-centered design with a survivor-centered one, accelerating recovery, lowering federal costs over time, and protecting the households and communities that the federal disaster system exists to serve.




**Challenge — Concentrated, repetitive disaster losses:** A small share of properties drives a disproportionate share of federal disaster losses, with the same households absorbing repeated damage, repeated displacement, and rising insurance and recovery costs while federal dollars are spent rebuilding the same vulnerable structures, often repeatedly. Current federal programs often result in piecemeal individual buyouts that fragment neighborhoods and erode local fiscal health. Federal policy can break this cycle by targeting mitigation where losses are concentrated, supporting community-led, voluntary alternatives to repeated rebuilding, and integrating disaster mitigation with the broader services consumers need to stabilize their lives.

## Policy Options:

- Prioritize federal mitigation funding explicitly for households and communities with repeated disaster losses, including NFIP repetitive loss and severe repetitive loss properties, cooperative housing common areas, and the wildfire and storm-prone analogues. Institute streamlined eligibility, simplified applications, dedicated technical assistance for under-resourced jurisdictions, and a federal preference for permanent risk reduction over short-term repair.
- Prioritize community-led, voluntary buyouts, relocations, and housing replacement options through federal recovery and mitigation programs that prepare receiving communities and preserve community cohesion, while supporting collective, neighborhood-scale decisions about strategic and planned relocation, rebuilding, or transformation.
- Establish a federal protect-or-relocate decision standard for repetitively damaged areas: require that before federal dollars fund another round of structural protection or rebuilding in a location with repeated federally compensated losses, the responsible agencies compare the full lifecycle cost of continued protection in place against the cost of voluntary buyout and relocation and direct funding to whichever path costs taxpayers less over the life of the asset. Where relocation is the lower-cost

[167] United States Government Accountability Office. (2022, December). *Disaster Recovery: Actions Needed to Improve the Federal Approach*, GAO-23-104956. https://www.gao.gov/products/gao-23-104956.

[168] United States Government Accountability Office. (2020, September). *Disaster Assistance: Additional Actions Needed to Strengthen FEMA's Individuals and Households Program*, GAO-20-503. https://www.gao.gov/products/gao-20-503.

[169] United States Environmental Protection Agency. (2026, July). *EPA Statement on Cross-Border Wildfire Smoke and Air Quality Impact in the U.S.* https://www.epa.gov/newsreleases/epa-statement-cross-border-wildfire-smoke-and-air-quality-impact-us.

path, trigger the community-led relocation architecture in the housing and land use benchmarks rather than defaulting to another rebuild, so that federal hardening investment is concentrated where protection is durable and cost-effective.

## Policy Context:

Repetitive disaster losses are a federally subsidized inefficiency at the heart of the disaster system. The same households absorb repeated damage, repeated displacement, and rising insurance and recovery costs while federal dollars repeatedly rebuild the same vulnerable structures, an outcome documented across FEMA's NFIP repetitive-loss data[170] and across GAO's body of disaster recovery work, including its placement of federal disaster assistance delivery on the High Risk List.[171] Targeting federal mitigation funds at repetitive-loss households and communities, prioritizing community-led voluntary buyouts and replacement options over piecemeal exits, and aligning with migration and land use reforms called for elsewhere in this chapter will break the federal cycle of paying for the same losses again and again while protecting consumers from the financial and emotional toll of repeated disasters.

**Challenge – Federal recovery dollars that rebuild yesterday's vulnerabilities:** Federal recovery dollars too often rebuild what was lost, in the same place and to the same standards, locking survivors and public budgets into the next disaster's losses. **FEDERAL POLICY CAN INSTEAD MAKE EVERY RECOVERY DOLLAR A DOWN PAYMENT ON LONG-TERM RISK REDUCTION BY REQUIRING HIGHER RESILIENCE STANDARDS, PREVENTING FEDERALLY FUNDED REBUILDING IN THE MOST HAZARDOUS LOCATIONS, AND SUPPORTING COMMUNITY-DRIVEN DECISIONS ABOUT WHETHER AND HOW TO REBUILD.**

## Policy Options:

- Require all federally funded rebuilding of housing, public facilities, and infrastructure to incorporate higher resilience standards, including modern model building and energy codes, forward-looking siting, hazard-specific protections (e.g., elevation, wildfire hardening, defensible space, extreme-heat protections), and continuity-of-operations requirements for critical facilities.
- Prohibit federally funded or federally permitted rebuilding in the most hazardous locations, including severe wildfire hazard zones, federally designated flood hazard areas, areas projected to be inundated by sea level rise, and repetitive-flood-loss locations, absent meaningful risk reduction, such as elevation, relocation, or comprehensive hazard mitigation. Coupling this standard with the federal climate-migration architecture in the housing and land use benchmarks will ensure households facing this constraint have real, well-supported alternatives.
- Support community-driven decisions about retreat, rebuilding, or transformation through federal disaster recovery programs with dedicated funding for community engagement, planning capacity, and decision-support tools that include forward-looking hazard data, risk projections, and cost modeling, ensuring that consumers and the local governments that serve them are equipped to choose among real options informed by the best available science.

## Policy Context:

Federal recovery spending is one of the largest single levers influencing community decision-making in the wake of declared disasters, but it has historically been a lever toward rebuilding back to status quo rather than risk reduction. Aligning federal recovery and rebuilding with long-term risk reduction is the single most consequential way to lower future federal disaster spending. Higher federal rebuilding standards, a prohibition on federally funded or permitted rebuilding in the most hazardous locations absent meaningful risk reduction, and federal support for community-driven decisions together can convert recovery dollars from a source of repeated losses into a tool for durable consumer protection and long-term federal cost containment. These solutions will help ensure that federal recovery dollars deliver durable, lower-cost assets rather than reconstructing yesterday's vulnerabilities.

Aligning federal recovery and rebuilding with long-term risk reduction is the single most consequential way to lower future federal disaster spending.

[170] See, e.g., House Committee on Financial Services. (2026, March). *Hearing Entitled: Mitigation and Multiple Loss Properties: Factors Influencing the High Cost of Flooding*. https://financialservices.house.gov/calendar/eventsingle.aspx?EventID=411040.

[171] United States Government Accountability Office. (2025, February). *High-Risk Series: Heightened Attention Could Save Billions More and Improve Government Efficiency and Effectiveness*, GAO-25-107743. https://www.gao.gov/products/gao-25-107743.

**Challenge – Lifeline failures that strand the survivors:** When water, energy, transportation, and communications systems fail in a disaster, survivors lose access to clean water, emergency information, work, school, and medical care. Further, the populations most dependent on these lifelines, including seniors, people with disabilities, low-income households, and people in rural and Tribal communities, often suffer the longest and most severe disruptions.

## Policy Options:

- Significantly increase federal investment to harden critical infrastructure systems, including water and wastewater, energy, transportation, and communications, against extreme events and other climate impacts.
- Strengthen and fund federal continuity-of-care obligations for vulnerable populations during and after disasters:
  - Require the Centers for Medicare & Medicaid Services (CMS) to enforce and resource emergency preparedness standards for home- and community-based service providers under the existing CMS Emergency Preparedness Rule.
  - Direct FEMA to fund state and local registries of medically dependent individuals, including dialysis patients, oxygen users, and those requiring refrigerated medications or in-home services, and integrate those registries into evacuation and shelter planning.
  - Establish a dedicated federal grant program for accessible emergency transportation and community resilience hubs that serve as cooling, charging, and accessible communication centers when systems fail.
  - Require HHS and FEMA to jointly report to Congress biennially on gaps in continuity of care for at-risk populations across federally declared disasters.
- Integrate forward-looking climate conditions explicitly into federal disaster risk reduction and emergency management planning and operations, ensuring that emergency operations plans, mutual aid agreements, evacuation planning, sheltering capacity, and continuity-of-operations plans are designed against the hazards consumers will face rather than the hazards of the past.

## Policy Context:

Lifeline failures are a persistent and consumer-facing feature of U.S. disaster losses. Hardening critical infrastructure, guaranteeing continuity of essential services for vulnerable populations, and integrating forward-looking climate conditions into emergency management planning will protect the consumers most exposed to lifeline failures. These solutions will reduce the duration and severity of disaster impacts and lower long-term federal recovery costs, advancing the consumer- and survivor-centered, affordability-focused ethos across every phase of the disaster lifecycle.



BENCHMARK #3.6:

# Communities protect health and reduce the growing costs of climate-driven illness.

**MORE FREQUENT EXTREME WEATHER AND WORSENING ENVIRONMENTAL CONDITIONS ARE INCREASING ILLNESS, DISRUPTING CARE, AND DRIVING UP HEALTHCARE UTILIZATION, PREMIUMS, AND HOUSEHOLD MEDICAL COSTS, ESPECIALLY AS COMMUNITIES FACE WORSENING HEAT, WILDFIRES AND SMOKE, FLOODING, INFECTIOUS DISEASE RISKS, AND DISASTER-RELATED MENTAL HEALTH BURDENS.** Without stronger federal action to reduce these risks, harden healthcare systems, and reduce cost burdens on families, these pressures will deepen inequities and make communities less healthy, less financially secure, and less resilient. This section provides policy options for three key challenges:

1. Underbuilt federal surveillance, forecasting, and prevention strategies for climate-driven illness
2. Healthcare systems and workforces that fail under climate stress
3. Federal institutions that drive, rather than prevent, climate-related illness



**Challenge – Underbuilt federal surveillance, forecasting, and prevention strategies for climate-driven illness:** Federal public health agencies lack the standardized surveillance, forecasting, and prevention infrastructure needed to anticipate and reduce climate-driven illness, leaving people exposed to avoidable hospitalizations, lost work and school days, and rising medical costs while emerging hazards, like extreme heat, wildfire smoke, vector-borne disease, waterborne illness, and disaster-related mental health outpace state and local capacity to respond.

## Policy Options:

- Authorize and fully fund the Centers for Disease Control and Prevention's (CDC) Climate and Health Program, expanding the Climate-Ready States and Cities Initiative from its current 13 jurisdictions to all 50 states, the District of Columbia, U.S. territories, and Tribal Nations. Support each jurisdiction with implementing the five-step Building Resilience Against Climate Effects (BRACE) framework to identify climate impacts and the most effective interventions, project disease burden, develop and execute adaptation plans, and evaluate outcomes. Pair the expanded program with a new Climate-Ready Tribes Program administered through the National Indian Health Board (NIHB) with adequate, multi-year funding to support Tribal-led adaptation planning grounded in Indigenous health frameworks.
- **BUILD A NATIONAL CLIMATE-HEALTH EARLY WARNING SYSTEM THROUGH CDC, IN COORDINATION WITH NOAA AND THE NATIONAL WEATHER SERVICE (NWS), TO INTEGRATE HEAT-AND-HEALTH FORECASTS, WILDFIRE-SMOKE AIR QUALITY ALERTS, VECTOR-BORNE AND WATERBORNE DISEASE SURVEILLANCE, AND HARMFUL ALGAL BLOOM ADVISORIES INTO A SINGLE, PLAIN-LANGUAGE, GEOGRAPHICALLY TARGETED FEDERAL ALERT SERVICE AVAILABLE TO PEOPLE, HEALTHCARE PROVIDERS, SCHOOLS, EMPLOYERS, AND EMERGENCY MANAGERS.** Anchor the system with a real-time syndromic surveillance backbone funded through the National Syndromic Surveillance Program's (NSSP) BioSense Platform, with mandatory reporting of heat-related, smoke-related, and other climate-sensitive emergency department visits, phased to jurisdiction readiness and enabled by dedicated funding for state and local data infrastructure and interoperability. Ensure accurate accounting of heat deaths through a federal heat-mortality reporting standard adopted across state vital statistics systems.
- Expand and fully fund the CDC's vector-borne and zoonotic disease programs, the Epidemiology and Laboratory Capacity (ELC) cooperative agreement, and CDC's Centers of Excellence for vector-borne diseases to address the geographic expansion of Lyme disease, mosquito-borne illnesses (e.g., West Nile, dengue, Zika), and waterborne pathogens (e.g., Vibrio and harmful algal blooms). Federal investment should be designed to more fully support state and local vector-control capacity, public-health entomology workforce, modernized laboratory diagnostics, and accelerated U.S. Food and Drug Administration (FDA) review pathways for new vector-borne disease vaccines, treatments, and diagnostics.
- Prioritize prevention and early intervention strategies through CDC and CMS programs and tools that reduce avoidable emergency care and protect household financial stability. Resource CDC to expand the National Asthma Control Program (NACP), the Cooling Centers and Heat Action Plan technical assistance program, and the Healthy Homes Program (jointly with HUD) to address indoor air quality, mold, lead, and heat exposure. Give CMS authority and resources to clarify and expand Medicare and Medicaid coverage of climate-health-relevant services – including renewable energy and storage, in-home cooling devices, and air filtration – as durable medical equipment when medically necessary; support community health worker visits to high-risk patients during heat, wildfire, and wildfire smoke events; and ensure telehealth continuity during disasters.

## Policy Context:

Climate-driven illness is already producing measurable human harm. Peer-reviewed research published in the *Journal of the American Medical Association* (JAMA) found that heat-related deaths in the United States increased from 1,069 in 1999 to 2,325 in 2023, with the age-adjusted mortality rate increasing 3.6% per year over the full period and accelerating to 16.8% per year between 2016 and 2023.[172] While these statistics are jarring, CDC death-certificate-based figures are widely understood to substantially undercount the true public-health burden of heat. CDC's Climate-Ready States and Cities Initiative has spent more than a decade demonstrating that the BRACE framework works to identify, prioritize, and act on local climate-health risks. However, with the program only active in 13 jurisdictions today, most Americans are in states where public health agencies lack dedicated federal climate-and-health support.[173,174] A permanently authorized national Climate and Health Program reaching every state, an integrated National Climate-Health Early Warning System, expanded federal vector and pathogen programs, and prevention-focused CDC and CMS coverage tools will prvoide a coherent system that reduces avoidable illness, lowers healthcare utilization, and stabilizes household and federal medical costs.

[172] Howard, J. et al. (2024, August). Trends of Heat-Related Deaths in the US, 1999-2023. *JAMA 332*(14). https://jamanetwork.com/journals/jama/fullarticle/2822961.

[173] Centers for Disease Control and Prevention. (2024, March). *Climate-Ready States and Cities Initiative.* https://www.cdc.gov/climate-health/php/climate_ready/index.html.

[174] Centers for Disease Control and Prevention. (2024, April). *Building Resilience Against Climate Effects (BRACE) Framework*. https://www.cdc.gov/climate-health/php/brace/index.html.

**Challenge – Healthcare systems and workforces that fail under climate stress:** Hospitals, clinics, long-term care facilities, dialysis centers, pharmacies, and home- and community-based service providers increasingly fail under climate stress, as they lose power, water, supplies, communications, or staff during extreme weather, and disrupting care for those who can least afford it. Today's federal healthcare-resilience requirements are uneven, under-enforced, and not designed to address the climate hazards that healthcare systems increasingly face.

## Policy Options:

- Update CMS's Emergency Preparedness Rule (*42 C.F.R. Part 482 et seq.*) to require:
  - Forward-looking climate hazard assessment, including heat, wildfire smoke, flooding, sea level rise, hurricane, and prolonged power loss.
  - Mandatory continuity-of-operations standards for critical care services such as dialysis, oxygen-dependent care, and behavioral health.
  - Backup power capable of sustaining safe indoor temperatures and life-sustaining equipment for a defined minimum number of hours.
  - Surge-capacity standards for predictable seasonal climate events supported by standardized climate hazard assessment tools developed by HHS with NOAA and FEMA.
- Establish a dedicated Healthcare Resilience Investment Program at HHS, jointly administered with the Health Resources and Services Administration (HRSA) and the CDC, to:
  - Provide grants and low-cost financing to harden hospitals, community health centers, Indian Health Service (IHS) facilities, rural health clinics, long-term care facilities, dialysis centers, pharmacies, and home- and community-based service providers against power outages, flooding, extreme heat, wildfire smoke, and supply chain disruption.
  - Include as eligible investments renewable energy and storage, backup power and microgrids, on-site water and oxygen storage, smoke- and heat-resilient heating, ventilation, and air conditioning (HVAC) and air filtration, flood elevation and dry-floodproofing, hardened communications and electronic health record continuity, and pre-positioned mobile and modular care infrastructure.
  - Prioritize projects by measured reductions in service disruption, patient displacement, and avoidable utilization, evaluated on health outcomes.
- Finalize the Occupational Safety and Health Administration's (OSHA) proposed Heat Injury and Illness Prevention standard for outdoor and indoor work settings (*89 Fed. Reg. 70698, August 30, 2024*), with explicit application to healthcare and public-health workers in field, ambulance, hospital, long-term care, and home-care settings with periodic review of exposure thresholds as occupational evidence evolves.
- Establish federal policy disaster-safety standards covering hazard pay, mental health support, childcare and elder care for responding workers, surge-capacity protections, and licensure portability across state lines during declared emergencies, and expand HRSA workforce programs (e.g., National Health Service Corps [NHSC], Nurse Corps, Behavioral Health Workforce Education and Training [BHWET] Program) with dedicated allocations for shortage areas exposed to repeated climate stress.
- Guarantee continuity of physical, behavioral, and mental healthcare for people during and after disasters through federal policy:
  - Automatically activate Medicare and Medicaid waivers.
  - Require mandatory portable telehealth coverage and prescription continuity protections within defined timeframes following a presidentially declared disaster.
  - Automatically activate the Substance Abuse and Mental Health Services Administration (SAMHSA) Disaster Distress Helpline and Crisis Counseling Assistance and Training Program (CCP) (administered by SAMHSA in partnership with FEMA) with culturally and linguistically appropriate services.
  - Dedicate federal funding for community-based behavioral health responders and home-and community-based service providers serving those who cannot be displaced into shelters or hospitals.

## Policy Context:

Healthcare-system failures during disasters convert short-term emergencies into long-term human harm and humanitarian catastrophes. Each of the more than 400 separate billion-dollar weather and climate disasters between 1980 and 2026 imposed well-documented disruptions on hospitals, dialysis centers, oxygen-dependent care, behavioral health services, and pharmacies.[175] The CMS Emergency Preparedness Rule, established in 2016, applies to 17 categories of Medicare- and Medicaid-participating providers and suppliers but does not yet require forward-looking climate hazard assessment or surge capacity

[175] Climate Central. (2026). *U.S. Billion-Dollar Weather and Climate Disasters*. https://www.climatecentral.org/climate-services/billion-dollar-disasters.

calibrated to projected climate conditions.[176,177] OSHA's August 2024 proposed Heat Injury and Illness Prevention standard would establish, for the first time, a federal heat-safety floor across general industry, construction, maritime, and agriculture, but it has not been finalized.[178,179] Taken together, modernizing the CMS Emergency Preparedness Rule, launching a federal Healthcare Resilience Investment Program, finalizing federal heat and disaster-safety standards for the healthcare and public-health workforce, and guaranteeing continuity of physical, behavioral, and mental healthcare during disasters will protect those who depend on these systems most, prevent care interruptions that drive avoidable hospitalizations and deaths, and lower long-term federal and household medical costs.

**Challenge – Federal institutions that drive, rather than prevent, climate-related illness:** Federal housing, infrastructure, and disaster recovery programs too often produce, or fail to prevent, the very conditions that drive climate-related illness, leaving people exposed to extreme heat, poor indoor air, water contamination, and disaster-related mental health harm. Without explicit federal integration of public health into these programs, cost burdens, healthcare premiums, and avoidable illness all rise.

## Policy Options:

- Require federal housing, infrastructure, and disaster recovery programs at HUD, USDA RD, FEMA, and federally backed mortgage finance – including Fannie Mae, Freddie Mac, FHA, and VA – to incorporate public-health protections into siting, design, construction, and rehabilitation. Require protections such as healthy-home standards (e.g., lead, mold, ventilation, indoor air quality), high-performance building standards (e.g., energy efficiency, electrification-readiness, heat- and smoke-resilient envelopes, Minimum Efficiency Reporting Value-13 or higher filtration where feasible), proactive lead service line replacement coordinated with EPA water programs, and madate integration with the HUD/CDC Healthy Homes Program, the DOE WAP, LIHEAP, including its cooling assistance authority, and the Healthy People in Healthy Places initiative. Pair any new health-based requirements with expanded pre-weatherization repair funding, building on DOE's Weatherization Readiness Fund (WRF), and explicitly authorize coordination of WAP, LIHEAP, Healthy Homes, and CDBG dollars in a single project, so that homes are made ready to meet the standards.
- Finalize the OSHA Heat Injury and Illness Prevention standard (*89 Fed. Reg. 70698*) without delay or weakening, as noted above, with mandatory water and rest breaks at defined heat-index trigger levels, acclimatization protocols, supervisor training, and meaningful enforcement. Further establish federal policy on complementary heat-protection standards for federally supported housing, federally supported schools, and federally supported correctional and detention facilities, recognizing that protection from extreme heat cannot stop at the workplace door.
- Permanently authorize and fully resource the SAMHSA Disaster Distress Helpline (1-800-985-5990) and the CCP with multilingual, culturally specific, and school-based services, automatic activation following presidentially declared disasters, and standing capacity to surge during compound events. Include dedicated set-asides for disaster- and climate-related behavioral health in the Substance Use Prevention, Treatment, and Recovery Block Grant (SUBG) and Community Mental Health Services Block Grant (MHBG), and expand Medicare and Medicaid coverage of community-based mental and behavioral health services to include long-term post-disaster recovery, recognizing that disaster-related mental health burdens disproportionately affect lower-income households and drive rising commercial and public insurance premiums.
- Require federal agencies to operate under a new Federal Climate Health Equity and Cost-Reduction Performance Standard to evaluate and publicly report on the measurable health-cost and equity outcomes of their programs, including reductions in climate-driven hospitalizations, emergency department visits, childhood asthma and heat illness, premature deaths, healthcare premiums, and out-of-pocket costs, with disaggregated reporting by income, race and ethnicity, age, disability status, geography, and Tribal status, including child-specific indicators that reflect children's distinct developmental exposures rather than scaled-down adult models. Reward through federal grant and benefit-cost guidance those investments that measurably reduce climate-driven health risks, stabilize healthcare premiums, and lower out-of-pocket costs for consumers, ensuring that federal dollars produce health outcomes with results informing future appropriations and program design.

[176] Centers for Medicare & Medicaid Services. (2016, September). *Emergency Preparedness Rule for Medicare and Medicaid Participating Providers and Suppliers*, 81 Fed. Reg. 63860. https://www.federalregister.gov/documents/2016/09/16/2016-21404/medicare-and-medicaid-programs-emergency-preparedness-requirements-for-medicare-and-medicaid.

[177] PART 482—CONDITIONS OF PARTICIPATION FOR HOSPITALS. 42 C.F.R. Part 482 et seq. https://www.ecfr.gov/current/title-42/part-482.

[178] Occupational Safety and Health Administration. (2024, August). *Heat Injury and Illness Prevention in Outdoor and Indoor Work Settings, Notice of Proposed Rulemaking*, 89 Fed. Reg. 70698. https://www.federalregister.gov/documents/2024/08/30/2024-14824/heat-injury-and-illness-prevention-in-outdoor-and-indoor-work-settings.

[179] See also, Occupational Safety and Health Administration. (n.d.). *Heat Injury and Illness Prevention in Outdoor and Indoor Work Settings Rulemaking*. https://www.osha.gov/heat-exposure/rulemaking. The proposed rule would apply to all employers in general industry, construction, maritime, and agriculture under OSHA jurisdiction, and would require heat-illness prevention plans, water and rest breaks at defined heat-index trigger levels, acclimatization protocols, and supervisor training; the rule remains pending final action.



## Policy Context:

Federal housing, infrastructure, disaster, and health programs interact to determine whether people live in homes, neighborhoods, and workplaces that protect their health or expose them to climate-driven illness. EPA has documented that the geographic range and incidence of climate-sensitive infectious diseases, including Lyme disease and other vector-borne illnesses, have expanded significantly across the United States, with corresponding increases in healthcare utilization and costs.[180] Children carry these burdens disproportionately, including through impacts to physical and mental health. EPA projects that climate-driven air quality changes alone will increase childhood asthma cases from 4% to 11%, and that over one million children could face displacement or home loss from coastal flooding at even moderate sea level rise.[181] Heat-related deaths have more than doubled since 1999,[182] and disaster-related mental health burdens are reflected in sustained demand for SAMHSA Disaster Distress Helpline and Crisis Counseling services following hurricanes, wildfires, and floods.[183]

At the same time, standards must come with repair funding. Roughly one-in-five income-eligible households seeking weatherization assistance were initially deferred in 2023 because conditions such as roof leaks, structural damage, or mold had to be corrected before efficiency work could proceed, at repair costs of $2,000 to $25,000 per home.[184] The WRF that was created to close this gap is appropriated at $30 million annually, against an estimated $91–$94 million in addressable need.[185] Making healthy, climate-resilient buildings the federal default; finalizing and enforcing strong federal heat safety standards across workplaces, housing, schools, and other federally supported settings; building durable federal capacity to address disaster- and climate-related mental and behavioral health; and establishing a federal climate-health equity and cost-reduction performance standard together will ensure federal housing, infrastructure, disaster, and health programs form a coherent consumer-protection system that reduces avoidable illness and lowers premiums and out-of-pocket costs.

[180] United States Environmental Protection Agency. (2016, August). *Climate Change Indicators: Lyme Disease and Climate Change Indicators: Heat-Related Illnesses*. https://19january2021snapshot.epa.gov/climate-indicators/climate-change-indicators-lyme-disease_.html.

[181] United States Environmental Protection Agency. (2023, April). *Climate Change and Children's Health and Well-Being in the United States*. https://www.epa.gov/system/files/documents/2023-04/CLiME_Final%20Report.pdf.

[182] Howard, J. et al. (2024, August). Trends of Heat-Related Deaths in the US, 1999-2023. *JAMA*, 332(14):1203. https://jamanetwork.com/journals/jama/fullarticle/2822854.

[183] Substance Abuse and Mental Health Services Administration. (2025, September). *Disaster Distress Helpline and Crisis Counseling Assistance and Training Program (CCP)*. https://www.samhsa.gov/find-help/disaster-distress-helpline. The Disaster Distress Helpline (1-800-985-5990) provides 24/7 multilingual crisis counseling and emotional support; the Crisis Counseling Assistance and Training Program is administered by SAMHSA in partnership with FEMA following presidentially declared disasters.

[184] Farrell, D., Mah, J., Sussman, R., & Specian, M. (2025, June). *Estimating the Impacts of Weatherization Readiness Programs*. American Council for an Energy-Efficient Economy. https://www.aceee.org/research-report/b2504.

[185] United States Department of Energy. (2025, April) *Weatherization Program Notice 24-9: Weatherization Readiness Fund – Implementation (Revised)*. https://www.energy.gov/scep/wap/articles/weatherization-program-notice-24-9-weatherization-readiness-fund-implementation.

BENCHMARK #3.7:

# Insurance and financial systems deliver affordable, reliable protection and long-term stability for households and communities.

**INSURANCE AND FINANCIAL SYSTEMS ARE INCREASINGLY STRAINED BY CLIMATE-DRIVEN LOSSES, WITH RISING PREMIUMS, NON-RENEWALS, WITHDRAWALS FROM HIGH-RISK MARKETS, AND A GROWING PROTECTION GAP LEAVING HOUSEHOLDS, SMALL BUSINESSES, AND LOCAL GOVERNMENTS EXPOSED TO FINANCIAL SHOCKS THEY CANNOT ABSORB.** Today's governance architecture is built around state-by-state insurance regulation, a single federal flood program operating under repeated short-term extensions, and incomplete federal financial stability oversight of climate risk. This was not designed for the scale and pace of risk now confronting insurers and policyholders alike. This division is statutory. The *McCarran-Ferguson Act of 1945* reserves insurance regulation to the states, and the FIO created by the *Dodd-Frank Act* monitors the industry but with no regulatory or oversight authority.[186] Insurers operate nationwide but choose which states to serve, and state regulators set rates and run insurers of last resort under political pressure to suppress prices. The federal government, which regulates neither, then absorbs the fiscal consequences when suppressed rates and overloaded residual markets fail. Each level of government faces incentives to shift risk to the other, and policyholders pay for the arbitrage. Federal policy must modernize this architecture so that consumers can still buy reliable protection, families and small businesses can absorb shocks without losing their footing, and the financial system itself remains stable as risk grows. This section provides policy options for three key challenges:

1. Rising premiums, non-renewals, and shrinking insurance availability
2. Cascading climate risks across markets
3. Disproportionate climate insurance and financial cost burdens on under-resourced households and communities



[186] 15 U.S.C. §§ 1011–1015; 31 U.S.C. § 313. https://www.law.cornell.edu/uscode/text/15/1011.

**Challenge – Rising premiums, non-renewals, and shrinking insurance availability:** Homeowners insurance is becoming more expensive and harder to obtain for tens of millions of American consumers, with rising premiums, non-renewals, and insurer market withdrawals concentrated in the places where households can least absorb the loss. No state acting alone can build the data infrastructure, federal coordination, and risk-transfer architecture needed to sustain clear price signals, stable insurance markets, and broad access to coverage as climate risk grows.

## Policy Options:

- Build a permanent, public national property insurance data system through a state-led, federally funded partnership. Authorize federal grants to state insurance regulators and the National Association of Insurance Commissioners (NAIC) to operate a standardized national data collection covering homeowners, renters, and commercial property insurance availability, affordability, non-renewals, claims experience, underwriting standards, and market entry, exit, and withdrawal decisions at zip code level – transitioning to census-tract-level granularity within three years. Build on the NAIC-state regulator data call and the Treasury Department's January 2025 first-of-its-kind analysis covering more than 246 million policies.[187] Federal funding can be conditioned on:
    - Participation by insurers representing substantially all national premium volume, including insurers headquartered in states that previously declined to participate.
    - Standardized definitions and public release of the data at the collected granularity, so that consumers, researchers, and Congress see the same market data that regulators see.
    - A dormant federal backstop that if participation falls below an established coverage threshold, the Treasury Department is authorized to collect the missing data directly, so that the partnership's success is what keeps data collection in state hands.
- Expand coverage to renters and affordable-housing-provider policies.
- Protect FIO's statutory authority under *31 U.S.C. § 313* to monitor the access of traditionally underserved communities, minorities, and LMI persons to affordable insurance products.
- Match residual-market transparency to the federal backstop these plans already rely on:
    - Require states to disclose to policyholders the contingent assessment liabilities embedded in these plans so consumers understand that an undercapitalized insurer of last resort is an impending tax on every insured household in the state.
    - Require annual public reporting to Congress, through the national data partnership, on every Fair Access to Insurance Requirements (FAIR) Plan,[188] wind pool, and state-chartered residual insurer, covering total exposure, policy growth, capitalization, reinsurance adequacy, and post-event assessment mechanisms.
    - Direct the Financial Stability Oversight Council (FSOC) under its existing mandate to monitor residual market concentration as a financial stability risk.
    - Exempt from federal income tax the surplus that FAIR Plans and other residual market mechanisms retain to pay claims and fund policyholder mitigation, conditioned on meeting the state regulatory integrity standards in this benchmark, including published depopulation plans, premium recognition of verified mitigation, and full participation in the national data partnership.
- Ensure that when actuarial-based prices reveal untenable risk, households have a funded path to act on the signal: pair risk-based insurance pricing with the community-led relocation, streamlined voluntary buyout, and receiving-community investments in the housing and land use benchmarks of this chapter, and ensure buyout offers are available pre- and post-disaster, so that the consumer response to an unaffordable premium can be a supported move to safer ground rather than going uninsured in place.
- Align state insurance regulation with the federal fiscal exposure it can create by conditioning enhanced federal disaster cost-shares and mitigation funding on state regulatory integrity standards; use of resilience-based building codes and standards; transparent, actuarially grounded rate review; mandatory recognition of verified mitigation, such as FORTIFIED certification and defensible-space standards, in premium setting; adequately capitalized residual market mechanisms with published depopulation plans; and full participation in the national property insurance data partnership.
- Amend the Internal Revenue Code (IRC) to allow insurers a deduction for contributions to dedicated, pre-event catastrophe reserve funds, with distributions taxed on withdrawal, replacing the current rule that permits insurers to reserve for disasters only after losses occur. Condition the tax deduction on recognizing verified mitigation in premium setting and funding policyholder mitigation programs.
- Enact a multi-year reauthorization of the NFIP, ending the era of more than 30 short-term extensions since FY2017, and pair reauthorization with structural reforms including:

[187] United States Department of the Treasury, Federal Insurance Office. (2025, January). *Analyses of U.S. Homeowners Insurance Markets, 2018–2022: Climate-Related Risks and Other Factors*. https://climateriskadvisors.com/resources/analyses-us-homeowners-insurance-markets-2018-2022.pdf.

[188] A State FAIR Plan is a state-mandated property insurance program that serves as an insurer of last resort for homeowners and businesses who cannot obtain coverage in the standard private market due to high-risk factors such as location, age, or construction type.

- Means-tested targeted premium support for LMI primary-residence policyholders, delivered through targeted premium support rather than universal rate caps. Limit eligibility limited to households whose ownership predates full risk-based pricing for their property, non-transferable upon sale. Include a standing voluntary buyout option, so that assistance operates as a bridge for the households the market repriced in place.
- Expanded Increased Cost of Compliance (ICC) limits to reflect modern construction and mitigation costs.
- Statutory authority for FEMA to forgive or restructure NFIP debt to the Treasury Department so that disaster claims do not become a permanent drag on policyholder premiums.
- Explicit integration with the modernized federal floodplain management floor and the climate-risk-aware mapping reforms in the land use benchmark of this chapter.

- Authorize and resource FEMA to support the development and deployment of parametric insurance products that pay claims rapidly based on objective triggers (e.g., wind speed, rainfall, temperature, fire perimeter), and community-based catastrophe insurance models that allow local governments to purchase coverage on behalf of residents in high-risk areas. Federal authorities also can support these tools through the Treasury Department and FIO technical assistance, consumer-protection rules, and integration with disaster recovery programs.

## Policy Context:

The U.S. insurance market is showing concrete signs of climate stress at scale. The Treasury Department's FIO, drawing on data covering more than 246 million policies from 2018 through 2022, found that average homeowners insurance premiums per policy increased 8.7% faster than inflation over that period, with non-renewal rates rising fastest in the highest-risk areas.[189] The analysis concluded that homeowners insurance is becoming more expensive and harder to procure as climate-related events impose growing challenges on insurers and consumers. The NFIP serves more than 4.7 million policies in over 22,000 communities, providing over $1.3 trillion in coverage, while carrying approximately $22.5 billion in debt, and has been operating under more than 30 short-term reauthorization extensions since 2017.[190] These numbers tell a story of structural insolvency, and GAO has warned that without congressional action to address the debt, actuarial soundness will be further degraded and affordability concerns will increase, while rising interest rates have more than doubled the program's annual debt service costs.[191,192] The state-federal mismatch is no longer theoretical. California's FAIR Plan has grown more than 200% since 2019. Residual plans in Louisiana, Florida, and other states can pass their losses through assessments on every other insurer in the state, meaning costs that flow directly into the premiums of households far from the highest-risk areas.[193] When rate suppression and residual-market overload culminate in market failure, no state mechanism exists to absorb the loss, and the federal government becomes the payer of last resort through disaster supplementals, federally backed mortgages, and the NFIP, without ever having held authority over the decisions that created the exposure.

The federal tax code compounds the residual-market problem. Most FAIR Plans are taxed as associations of private insurers, so surplus retained against the next catastrophe is reduced by federal income tax, and insurers may not deduct contributions to pre-event catastrophe reserves at all, a treatment CRS has concluded discourages pre-funded catastrophe capacity. Congress moved in 2025 to recognize state disaster declarations for casualty loss deductions while leaving state mitigation grants federally taxable, taxing the prevention while deducting the loss.

These policy options operate as a compact, not a takeover: states remain the primary regulators of insurance and enhanced federal benefits flow to the states that let consumers, Congress, and the public see the risk the federal balance sheet is already standing behind. These recommendations will ensure people remain centered in this complex system, resulting in risk information consumers can trust, premiums that reward measurable risk reduction, and funded pathways to safer ground.



[189] United States Department of the Treasury, Federal Insurance Office. (2025, January). *Analyses of U.S. Homeowners Insurance Markets, 2018–2022: Climate-Related Risks and Other Factors.* https://climateriskadvisors.com/resources/analyses-us-homeowners-insurance-markets-2018-2022.pdf.

[190] Horn, D. (2025, March). *Issues for Reauthorization and Reform of the National Flood Insurance Program*, IF12810. Congressional Research Service. https://www.congress.gov/crs-product/IF12810.

[191] United States Government Accountability Office. (2020, June). *National Flood Insurance Program: Fiscal Exposure Persists Despite Property Acquisitions*, GAO-20-508. https://www.gao.gov/products/gao-20-508.

[192] Taxpayers for Common Sense. (2026, April) *Five Fast Facts about the National Flood Insurance Program.* https://www.taxpayer.net/transportation-infrastructure/five-fast-facts-about-the-national-flood-insurance-program/.

[193] United States Senate Budget Committee. (2024, December). *Next to Fall: The Climate-Driven Insurance Crisis is Here – And Getting Worse.* https://www.budget.senate.gov/imo/media/doc/next_to_fall_the_climate-driven_insurance_crisis_is_here__and_getting_worse.pdf.

**Challenge – Cascading climate risks across markets:** Climate-driven property losses, insurance non-renewals, and asset revaluations are creating cascading risks across the financial system, from federally backed mortgage finance to community bank balance sheets to municipal bond markets, that today's federal financial regulators are not yet fully equipped to monitor or manage. Without coordinated federal action, these shocks threaten consumer wealth, household financial stability, retirement security, and the broader economy.

## Policy Options:[194]

- Codify climate-related financial risk as a permanent priority of the FSOC and its member agencies, building on both FSOC's 2021 identification of climate change as an emerging and increasing threat to U.S. financial stability and on the Climate-related Financial Risk Committee (CFRC) that FSOC established in response. Require regular FSOC reporting on climate-related financial risks through the codified framework and sustained funding and authority for the Office of Financial Research (OFR) Joint Analysis Data Environment for climate-related data. Mandate explicit incorporation of climate-related risk into the supervisory programs of the Federal Reserve, Office of the Comptroller of the Currency (OCC), Federal Deposit Insurance Corporation (FDIC), National Credit Union Administration (NCUA), Securities and Exchange Commission (SEC), Commodity Futures Trading Commission (CFTC), and federal housing finance regulators, with explicit consumer-protection guardrails to ensure that risk-aware supervision does not become an instrument of redlining.
- Mandate a recurring, system-wide climate scenario exercise, conducted at least biennially by the Federal Reserve and the OFR on behalf of FSOC, that models the financial system as a whole rather than institution by institution, covering banks of all sizes, credit unions, insurers and reinsurers, nonbank mortgage originators and servicers, the housing Government Sponsored Enterprises (GSE), pension funds, and household balance sheets. Incorporate scenarios that include compound events, such as a major U.S. catastrophe coinciding with a geopolitical disruption of global reinsurance capacity. Require the exercise to explicitly trace risk migration between sectors, so that risk shed by large banks onto smaller institutions, insurers, GSEs, or homeowners registers as risk relocated rather than risk reduced, and require public reporting of results so that a systemic exposure cannot remain invisible to the monitors responsible for finding it.
- Require federal directives to FHFA, Fannie Mae, Freddie Mac, FHA, VA, USDA RD, and Ginnie Mae to integrate forward-looking climate risk into underwriting, appraisal, scenario analysis, stress testing, and credit risk transfer transactions. Couple this with consumer protections, including premium and rate-shock assistance for under-resourced households, prohibitions on discriminatory pricing, expansion of mandatory flood insurance requirements to areas projected to face material flood risk under forward-looking conditions, and mandatory standardized climate risk disclosure to borrowers at origination.
- Develop and apply climate-related risk supervisory expectations through federal banking and insurance regulators, including the Federal Reserve, OCC, FDIC, NCUA, NAIC-coordinated state regulators, and FIO, covering physical and transition risk, climate scenario analysis, concentration risk in climate-exposed regions, and capital and liquidity requirements calibrated to the actual loss potential of climate hazards. Authorize federal regulators to designate major property and casualty insurers and other systemically important nonbank financial institutions for enhanced federal supervision under existing FSOC designation authority where warranted by climate-related financial stability risks.
- Support state and local government access to municipal credit markets for resilience-building project investments in climate-exposed jurisdictions through technical assistance and federal credit enhancement for resilience investments:
  - Direct the SEC's Office of Municipal Securities to standardize climate risk disclosure in municipal securities offerings.
  - Develop and apply climate-related fiduciary guidance through federal pension and retirement security regulators, including the U.S. Department of Labor (DOL) and the Pension Benefit Guaranty Corporation (PBGC), to protect retirement assets from concentrated climate-driven losses.
  - Charter a federal municipal bond clearinghouse, drawing on the demonstrated model of the Federal Reserve's pandemic-era Municipal Liquidity Facility and the structure of the housing GSEs, authorized to purchase qualifying municipal bonds and securitize them into standardized asset-backed securities.
- Modernize the federal tax code's municipal financing tools so state and local governments can raise low-cost capital for resilience at scale:
  - Amend the IRC to add clean energy, grid modernization, and climate-resilient infrastructure, as well as pre-event capitalization of adequately governed state residual insurance mechanisms, as eligible Private Activity Bond categories, and raise the qualified small issue bond limitation above the current $10 million cap so communities can finance larger-scale clean manufacturing projects.
  - Raise state volume caps in tandem with expanded eligibility so new categories generate new issuance rather than competing with affordable housing bonds for existing capacity.
  - Revise the arbitrage rules of *IRC Section 148* so states and localities can confidently issue tax-exempt bonds to capitalize public revolving loan funds that make catalytic investments in public and private resilience projects.

[194] The Policy Options set forth here align closely with those in Chapter 8: Accessible, Low-Cost Finance for a Clean Energy Future, Benchmark #8.6.

## Policy Context:

Federal financial regulators have begun to recognize the financial-stability dimensions of climate risk, but the underlying exposures continue to grow faster than regulatory capacity. In 2021, the FSOC became the first U.S. financial regulator to formally identify climate change as an emerging and increasing threat to financial stability, and it has since identified the potential for risk transfer from mortgage defaults associated with uninsured damages to other parts of the financial system.[195] CBO found that 40% to 50% of expected flood damage to homes with federally backed mortgages occurs outside FEMA-designated Special Flood Hazard Areas where flood insurance is not required. Further, CBO observed that the subsidy cost from flood damage to federally backed mortgages was approximately $275 million in FY2024 and is projected to rise to $395 million by 2053 under an intermediate climate scenario. Finally, CBO found that approximately 90% of the total flood-related mortgage subsidy cost is concentrated in the riskiest 25% of census tracts.[196,197] Federal supervisory practice has not kept pace with these exposures. The Federal Reserve's only climate scenario exercise to date, a pilot completed in 2024, covered six of the largest bank holding companies, was explicitly exploratory, and carried no capital or supervisory consequences.[198] In January 2025, the Federal Reserve, FDIC, and FIO each withdrew from the Network of Central Banks and Supervisors for Greening the Financial System, with the Federal Reserve stating that the network's work had moved beyond its statutory mandate.[199,200]

The events of 2026 demonstrate how quickly correlated shocks move through global insurance markets. Since the conflict disrupted the Strait of Hormuz, a corridor carrying oil equivalent to roughly 20% of global petroleum consumption,[201] private war-risk coverage has been cancelled or repriced within hours or days, and the federal government has had to step in as reinsurer of last resort: the U.S. International Development Finance Corporation (DFC) pledged $20 billion in maritime reinsurance, expanded to $40 billion with private partners.[202,203,204] When private insurance withdraws faster than governments can react, the public balance sheet arrives on terms it never priced. And because the global reinsurance capital that absorbed those shocks is the same capital that backs U.S. hurricane and wildfire risk, repricing in one corridor tightens capacity and raises premiums for households an ocean away. The International Monetary Fund (IMF) warns that the conflict's amplification channels could tighten financial conditions well beyond the region.[205]

A financial oversight architecture that models climate, geopolitical, and cyber shocks in isolation will miss exactly this compounding; only a statutory mandate for system-wide scenario analysis closes that blind spot. The municipal bond market is where household costs and climate risk meet. When a community's borrowing costs rise, consumers pay through higher rates, fares, and taxes. Codifying climate-related financial risk in FSOC and federal financial regulator mandates; requiring system-wide climate scenario analysis that traces risk as it moves between institutions; building climate-risk resilience into federally backed mortgage finance; strengthening bank, credit union, and insurer climate-risk supervision; and protecting municipal credit markets and public pensions together will convert federal financial-stability oversight from a reactive monitoring posture into a proactive consumer-protection system that lowers the long-term cost of climate-driven shocks to households and communities.

The municipal bond market is where household costs and climate risk meet. When a community's borrowing costs rise, consumers pay through higher rates, fares, and taxes.



[195] Financial Stability Oversight Council. (2021, October). *Report on Climate-Related Financial Risk*. https://home.treasury.gov/system/files/261/FSOC-Climate-Report.pdf.

[196] Congressional Budget Office. (2023, November). *Flood Damage and Federally Backed Mortgages in a Changing Climate*. https://www.cbo.gov/publication/59753.

[197] Congressional Budget Office. (2024, July). *The Effects of Flood Damage on the Subsidy Cost of Federally Backed Mortgages: Working Paper 2024-04*. https://www.cbo.gov/system/files/2024-07/60167-Flood-WP.pdf.

[198] Board of Governors of the Federal Reserve System. (2024, May). *Federal Reserve Board Releases Summary of the Exploratory Pilot Climate Scenario Analysis (CSA) Exercise*. https://www.federalreserve.gov/newsevents/pressreleases/other20240509a.htm.

[199] Board of Governors of the Federal Reserve System. (2025, January). *Federal Reserve Board Announces It Has Withdrawn from the Network of Central Banks and Supervisors for Greening the Financial System (NGFS)*. https://www.federalreserve.gov/newsevents/pressreleases/bcreg20250117a.htm.

[200] The European Central Bank, by contrast, has twice conducted an economy-wide climate stress test spanning firms, households, and nearly the entire euro area banking sector. See, e.g., Alogoskoufis, S. et al. (2021, September). *ECB Economy-Wide Climate Stress Test*, Occasional Paper No. 281. European Central Bank. https://www.ecb.europa.eu/pub/pdf/scpops/ecb.op281~05a7735b1c.en.pdf.

[201] United States Energy Information Administration. (2025, June). *Amid Regional Conflict, the Strait of Hormuz Remains Critical Oil Chokepoint*. https://www.eia.gov/todayinenergy/detail.php?id=65504.

[202] United States International Development Finance Corporation. (2026, March). *DFC Announces $20B Plan for Maritime Reinsurance in the Gulf*. https://www.dfc.gov/media/press-releases/dfc-announces-20b-plan-maritime-reinsurance-gulf. U.S. International Development Finance Corporation, *DFC, Chubb Announce Additional American Reinsurance Partners and up to $40B in Coverage for Maritime Reinsurance* (2026), https://www.dfc.gov/media/press-releases/dfc-chubb-announce-additional-american-reinsurance-partners-and-40b-coverage.

[203] United States International Development Finance Corporation. (2026, April). *DFC, Chubb Announce Additional American Reinsurance Partners and up to $40B in Coverage for Maritime Reinsurance*. https://www.dfc.gov/media/press-releases/dfc-chubb-announce-additional-american-reinsurance-partners-and-40b-coverage.

[204] Akhtar, S. & Brown, N. (2026, May). *DFC Shipping Reinsurance Facility: Iran Conflict and Strait of Hormuz*. Congressional Research Service. https://www.congress.gov/crs-product/IN12688.

[205] International Monetary Fund. (2026, April). *Global Financial Stability Report: Global Financial Markets Confront the War in the Middle East and Amplification Risks*. https://www.imf.org/en/publications/gfsr/issues/2026/04/14/global-financial-stability-report-april-2026.

**Challenge – Disproportionate climate insurance and financial cost burdens on under-resourced households and communities:** Consumers most exposed to climate risk, including LMI households, communities of color, rural and Tribal communities, renters, and households living in historically underinvested places, also bear the highest insurance and financial costs while having the fewest tools to manage them. Federal consumer protection authorities have not yet been fully deployed to address the climate-driven affordability crisis or to ensure equitable access to risk-transfer and recovery tools.

## Policy Options:

- Deploy federal consumer financial protection authorities, including the Consumer Financial Protection Bureau (CFPB) in coordination with FIO, the Federal Trade Commission (FTC), and HUD, to address climate-driven insurance and credit burdens through monitoring of force-placed insurance, mortgage servicing practices following disaster events, post-disaster credit reporting protections, debt-collection forbearance during and after disaster events, and consumer-facing complaint channels for climate-related insurance and credit harms. Extend *Fair Credit Reporting Act and Fair Housing Act* protections to climate-related credit and insurance practices to prevent risk-based pricing from becoming an instrument of de facto redlining.
- Establish a means-tested federal Climate Insurance and Recovery Affordability Program to provide premium assistance, mitigation cost-sharing, and post-disaster transition support for LMI homeowners and renters facing climate-driven insurance costs they cannot reasonably absorb, with eligibility designed to avoid perverse incentives that subsidize new development in extreme-risk areas. Ensure coordination with FEMA, HUD CDBG and CDBG-DR programs, USDA RD, and IHS's housing partners to waive local match requirements for disadvantaged communities, and with the climate-migration and receiving-communities architecture in the housing, land use, and disaster recovery benchmarks of this chapter.
- Direct the Treasury Department, SBA, and FEMA to establish consumer-facing financial tools to make resilience and recovery affordable, including:
  - Tax-advantaged Disaster Savings Accounts modeled on Health Savings Accounts (HSA).
  - A refundable federal Resilience Tax Credit for qualifying mitigation investments, such as wildfire hardening, elevation, defensible space, hurricane shutters, retrofit energy efficiency, and electrification-readiness.
  - Exclusion from gross income of hazard mitigation payments received from state, local, Tribal, territorial, and utility programs, charitable organizations, insurers, and FAIR Plans, whether paid to homeowners, renters, landlords of affordable rental housing, or housing cooperative and condominium associations, extending the existing *IRC Section 139(g)* exclusion for federal mitigation payments so that a homeowner hardening a roof with a state grant is not taxed for it while a neighbor using a FEMA grant is not.
  - Federally backed low-cost financing through state-level Resilience Revolving Loan Funds (building on FEMA's Safeguarding Tomorrow Revolving Loan Fund authorized in *P.L. 117-58*) and Community Development Financial Institutions (CDFI) Fund partnerships.
  - Small-business resilience financing through SBA disaster-mitigation lending and Economic Development Administration (EDA) economic resilience grants.
- Require federal agencies, including the Treasury Department, HUD, USDA, FEMA, FHFA, federal banking regulators, SEC, and CFPB, to evaluate and publicly report on the measurable consumer outcomes of their insurance and financial-system actions, including reductions in non-renewals, reductions in average premiums and out-of-pocket costs in climate-exposed jurisdictions, expanded coverage among historically underserved households and communities, and reductions in concentrated climate-driven losses across federally regulated financial markets. Require disaggregated reporting by income, race and ethnicity, geography, and Tribal status to ensure that federal action measurably narrows climate-driven affordability gaps rather than only producing program outputs.

## Policy Context:

Climate-driven insurance and financial costs disproportionately fall on those least able to absorb them. FIO's January 2025 analysis of more than 246 million policies confirms that homeowners in communities affected by substantial weather events are paying far more than those elsewhere, with non-renewal rates concentrated in the highest-risk areas.[206] FIO's statutory mandate to monitor the access of traditionally underserved communities, minorities, and LMI persons to affordable insurance products, codified at *31 U.S.C. § 313(c)(1)(B)* and reinforced by *Executive Order (E.O.) 14030*, gives the federal government durable authority to act on these findings.[207,208] A comprehensive approach that includes expanded federal consumer financial protection authorities, a means-tested Climate Insurance and Recovery Affordability Program, federal disaster savings and resilience finance tools for households and small businesses, and a federal climate-insurance equity and cost-reduction performance standard will deliver measurable consumer outcomes and ensure that the modernized federal insurance and financial-system architecture protects every American household, not only those who can already afford to be protected. The equity dimension of the climate insurance and financial crisis is a federal consumer-protection imperative.

[206] United States Department of the Treasury, Federal Insurance Office. (2025, January). *Analyses of U.S. Homeowners Insurance Markets, 2018–2022: Climate-Related Risks and Other Factors*. https://climateriskadvisors.com/resources/analyses-us-homeowners-insurance-markets-2018-2022.pdf.

[207] United States Department of the Treasury, Federal Insurance Office. (2026, July). *Statutory mandate to monitor the extent to which traditionally underserved communities, minorities, and low- and moderate-income persons have access to affordable insurance products*, 31 U.S.C. § 313(c)(1)(B). https://uscode.house.gov/view.xhtml?req=(title:31%20section:313%20edition:prelim).

[208] Executive Order 14030. (2021, May). *Climate-Related Financial Risk*, 86 Fed. Reg. 27967. https://www.federalregister.gov/documents/2021/05/25/2021-11168/climate-related-financial-risk. Directing FIO to assess the potential for major disruptions of private insurance coverage in regions of the country particularly vulnerable to climate change impacts.



CHAPTER 4:

# Safe, Clean, and Prosperous Ecosystems

## For 250 years, American prosperity has been built on the nation's abundant natural resources.

When ecosystems are fully sustained and restored, healthy lands and waters support iconic species like the giant sequoia and bald eagle, while strengthening everyday life and livelihoods. Clean water, productive landscapes, and resilient coasts underpin key industries, reduce the impacts of extreme heat, and protect communities from increasingly severe storms, delivering substantial economic and social value. Because these resources are largely shaped by federal policy and management, the federal government has a central role in ensuring they are sustained over time. Coordinated federal action is essential to align incentives, support stewardship, and maintain the natural foundations of economic prosperity. Conserving nature is vital to public health, economic opportunity, and long-term resilience.

**TO CREATE A THRIVING ECONOMY, THIS CHAPTER FOCUSES ON ACHIEVING THE FOLLOWING BENCHMARKS TO SUPPORT SAFE, CLEAN, AND PROSPEROUS ECOSYSTEMS:**

- **BENCHMARK #4.1:** Public health is strengthened through guaranteed access to clean air and water for all generations. | 105
- **BENCHMARK #4.2:** Empowered Native communities lead conservation efforts that preserve biodiversity and strengthen cultural heritage. | 109
- **BENCHMARK #4.3:** Nature is an economic asset, driving business growth and job creation. | 112
- **BENCHMARK #4.4:** Biodiversity is safeguarded as both intrinsically valuable and a foundation of sustainable economic growth. | 115
- **BENCHMARK #4.5:** Our lands are managed for balanced multi-use, maximizing ecosystem services that drive resilient local economies. | 118
- **BENCHMARK #4.6:** Healthy, resilient, and sustainably managed ocean and coastal ecosystems support growing economies. | 121
- **BENCHMARK #4.7:** Nature is fully accounted for in economic systems and fiscal decision-making. | 123

# Rep. Maxine Dexter

## OR–03



**IN MY HOME STATE OF OREGON, WE ARE FEELING THE IMPACTS OF CLIMATE CHANGE EVERY DAY – INCLUDING EXTREME HEAT, SEVERE STORMS, DROUGHT, AND CATASTROPHIC WILDFIRES AND SMOKE.** These events are known to have caused more deaths than any other natural disaster in Oregon. The harm is broad and severe with increased medical visits, absenteeism from work and school, decreased productivity, and mental health impacts across the state. Climate change is a public health emergency, and in Oregon the state and local jurisdictions have taken action to mobilize resources to address it. It's time for our federal government to do the same.

I grew up in the Pacific Northwest, and like many children, I spent endless hours outside with my family, camping, hiking, rafting, fishing, clamming and swimming. Our summers were glorious – windows open at night to let the cool air come in and then closing them in the morning on the really hot days. No one I knew growing up had air conditioning. So much has changed. Now the heat and smoke are frequently so severe that families suffer and are at risk if they don't have access to ventilation systems and air conditioning. Being outside during extreme heat and smoke events is literally bad for our health.

In August 2025, I spent four days hiking around Mt. Hood on the Timberline Trail – an ecological, cultural, and spiritual touchstone for me and many Oregonians. During that trip, I had a chance to speak with leaders and advocates for people who depend on and treasure the mountain and surrounding forests: Tribal communities, National Forest Service workers, volunteer wildland firefighters, environmentalists, and more. It is clear we need to safeguard our ecosystems – to ensure equal access, to balance responsible use with protection, and support outdoor recreation and restoration economies.

For 250 years, American prosperity has been built on the nation's abundant natural resources. This Safe, Clean, and Prosperous Ecosystems chapter of the Thriving Economy Project lays the foundation for ensuring our natural resources are protected and prosperous for the next 250 years. When ecosystems are fully sustained and restored, healthy lands and waters support iconic species like the giant sequoia, Chinook salmon, and bald eagle while strengthening everyday life and livelihoods. Clean water, productive landscapes, and resilient coasts sustain key industries, reduce the impacts of extreme heat, and protect communities from increasingly severe storms, delivering substantial economic and social value. Because these resources are largely shaped by federal policy and management, the federal government has a central role in ensuring they are sustained over time. Coordinated federal action is essential to align incentives, support stewardship, and maintain the natural foundations of economic prosperity. Conserving ecosystems is essential to public health, economic opportunity, and long-term resilience.



BENCHMARK #4.1:

# Public health is strengthened through guaranteed access to clean air and water for all generations.

**MILLIONS OF PEOPLE LACK RELIABLE ACCESS TO CLEAN AIR AND SAFE DRINKING WATER, WHICH RESULTS IN MEASURABLE NEGATIVE HEALTH IMPACTS FROM INCREASED ASTHMA RATES TO HEART ATTACKS AND STROKES.** ACCESS TO CLEAN AIR AND CLEAN WATER ARE CRITICAL FOR MAINTAINING HUMAN HEALTH, AND EVIDENCE HAS SHOWN THAT INTERVENTIONS SUCH AS THE *CLEAN AIR ACT* HAVE INCREASED LIFE EXPECTANCY ON AVERAGE BY MORE THAN TWO YEARS.[209] All people deserve clean air, drinkable water, and access to nature. This section provides policy options for three key challenges:

1. Ecosystem loss that increases costs
2. Limited access to nature, harming communities
3. Pollution that harms ecosystems and people



[209] Pope, C., Ezzati, M., & Dockery, D. (2009, January). Fine-Particulate Air Pollution and Life Expectancy in the United States. *New England Journal of Medicine, 360*(4). https://www.nejm.org/doi/full/10.1056/NEJMsa0805646#t=articleResults

**Challenge – Ecosystem loss that increases costs:** The loss of healthy and resilient forests, wetlands, and watersheds strains communities by increasing costs for utilities, healthcare, and infrastructure.

## Policy Options:

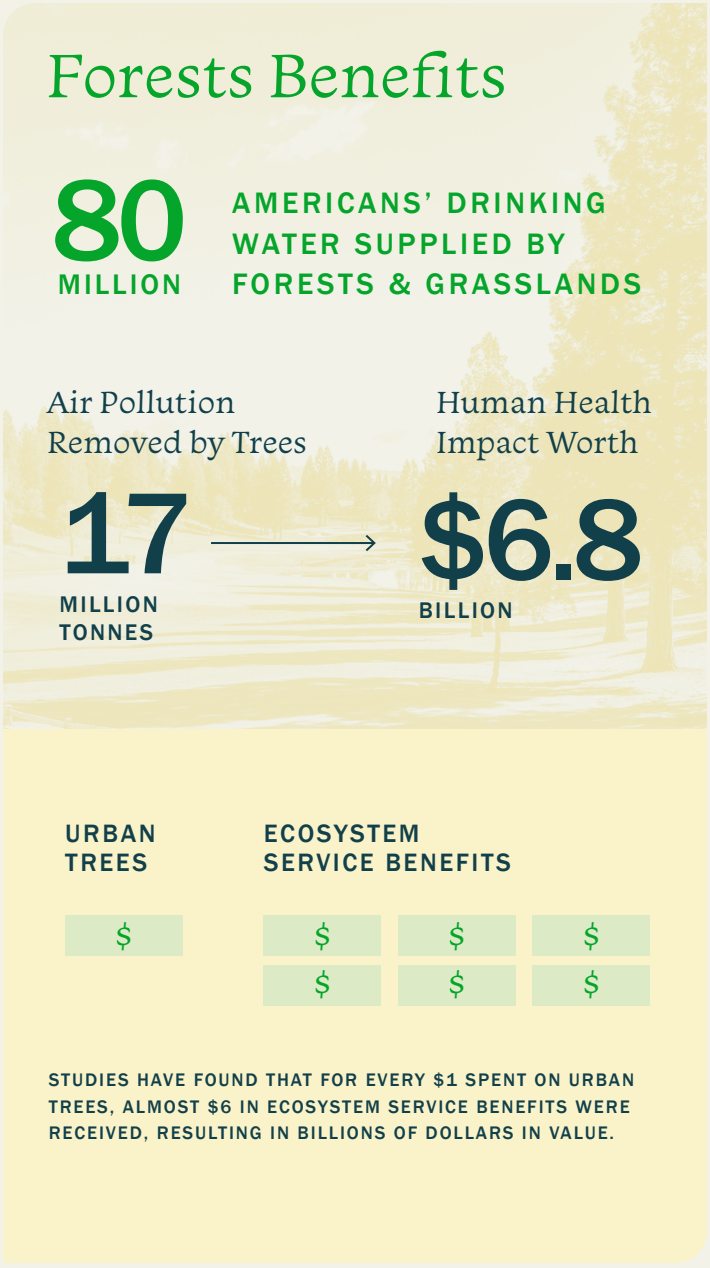
- Protect critical ecosystems, including forests, wetlands, and grasslands, that contribute to clean air and water through conservation easements, collaborative restoration programs, and protection measures.
- Strengthen and expand the Urban Community Forestry Program and other programs that invest in urban tree canopies to make neighborhoods safer and healthier, while creating new jobs and economic opportunities for communities.
- Establish proactive watershed-scale protections and watershed protection collaboratives.
- Remove barriers to freshwater ecosystems, including dams and culverts, to reestablish ecological connectivity and improve water quality

## Policy Context:

Protecting critical ecosystems is a cost-effective investment in vital infrastructure for communities, providing clean air and clean water for a fraction of the cost of traditional built infrastructure. Voluntary conservation programs that bring together key partners from across communities, from federal agencies to local businesses and private landowners, can provide durable protections for ecosystems on private and public lands.

Forests and grasslands filter water that supplies more than 80 million Americans with drinking water, prevent harmful erosion that clogs critical waterways, and help control catastrophic flooding. Forests remove harmful airborne pollutants, with one study estimating that trees removed over 17 million tonnes of air pollution, with an impact on human health worth $6.8 billion.[210] Planting trees and expanding urban green space can reduce the impacts of extreme heat by providing shade, removing air pollutants, and lowering ambient temperatures, which can also help decrease utility bills. Studies have found that for every $1 spent on urban trees, almost $6 in ecosystem service benefits were received, resulting in billions of dollars in value.[211] Additionally, urban forests spur economic opportunities, providing jobs, increasing business income, and increasing property values.

In order to ensure access to clean, safe water, it is necessary to protect the entire watershed, from the headwaters to the outlet to the ocean. Given the sometimes immense geographies, such as the 31 states that encompass the Mississippi watershed, collaboration and coordination are critical to ensure clean water for everyone. Another key to safe and clean water is to prevent ecosystem fragmentation caused by dams or small culverts. These barriers can lead to buildup of sediment and change water temperatures that impact fish habitat and degrade water quality. Removing small, outdated dams or expanding culverts reconnects freshwater ecosystems, improving water quality and reestablishing important habitat for fish and other aquatic organisms.




[210] Nowak, D., Hirabayashi, S., Bodine, A., & Greenfield, E. (2014, October). Tree and forest effects on air quality and human health in the United States. *Environmental Pollution, 193*. https://www.sciencedirect.com/science/article/abs/pii/S0269749114002395?via%3Dihub.

[211] McPhearson, E., van Doorn, N., & de Goede, J. (2016, June). Structure, function and value of street trees in California, USA. *Urban Forestry & Urban Greening, 17*. https://www.sciencedirect.com/science/article/abs/pii/S1618866715301400?via%3Dihub.

**Challenge – Limited access to nature, harming communities:** Because access to nature is unevenly distributed, many communities are deprived of essential health, economic, and climate benefits, exacerbating existing inequities.

## Policy Options:

- Invest in and expand proven programs that bolster access to nature and green space, including the Land and Water Conservation Fund's (LWCF) Outdoor Recreation Legacy Partnership (ORLP) program.
- **ESTABLISH A NATIONAL OUTDOOR EQUITY FUND TO ENSURE FAIR AND EVEN ACCESS TO PARKS, GREEN SPACE, AND OUTDOOR RECREATION FOR YOUTH IN EVERY COMMUNITY.**
- Fund collaborative regional trail, transit, and visitor service initiatives that expand access to public lands and waters and spread economic benefits beyond gateway communities.

## Policy Context:

Parks and green spaces overwhelmingly provide benefits to those able to experience them. They provide improved mental and physical health, including reductions in depression and anxiety, stronger social ties within communities, and improved attention spans and capacity for deep, sustained focus. Investing in outdoor access through new and existing programs to build, maintain, and provide access to green spaces is a key tool for improving the health and well-being of communities across the country. For example, the ORLP program provides grant funding to urban communities to create new outdoor spaces or rehabilitate existing parks to increase the quality of local green spaces but is currently only open to communities with more than 25,000 people. A revision of the size and matching fund requirements can significantly expand ORLP programs to more communities nationwide.

Building on successful models from several states,[212] outdoor equity funds provide grants to organizations to provide access to green space, while also supporting education programs and recreational opportunities and preserving biodiversity. Funded programs have ranged from teaching kids to ride bikes to job training for outdoor recreation careers, like guides for hikes or whitewater rafting trips.

Federal programs that focus on access to green space – from U.S. Department of Transportation (DOT) grants for active transportation corridors to deferred maintenance projects on public lands – should be prioritized for funding. Additionally, new urban green spaces should prioritize connection to public transit during siting and design phases.

**Challenge – Pollution that harms ecosystems and people:** Harmful pollutants, including plastics, Per- and Polyfluoroalkyl Substances (PFAS), and heavy metals, degrade the environment and exact heavy economic tolls on exposed communities.

## Policy Options:

- Incentivize decreasing use of single-use plastics through reuse and refill programs.
- Establish Extended Producer Responsibility (EPR) to hold producers responsible for the entire lifecycle of their products.
- Designate additional PFAS forever chemicals as hazardous substances under federal law to allow for faster remediation of contaminated sites.
- Develop comprehensive cleanup standards that address the leaching of PFAS from soil into groundwater and require responsible parties to pay for cleanup.
- Expand efforts to address legacy pollution and enhance public health and safety through the Abandoned Hardrock Mine Reclamation (AHMR) Program and the Orphaned Wells Program.

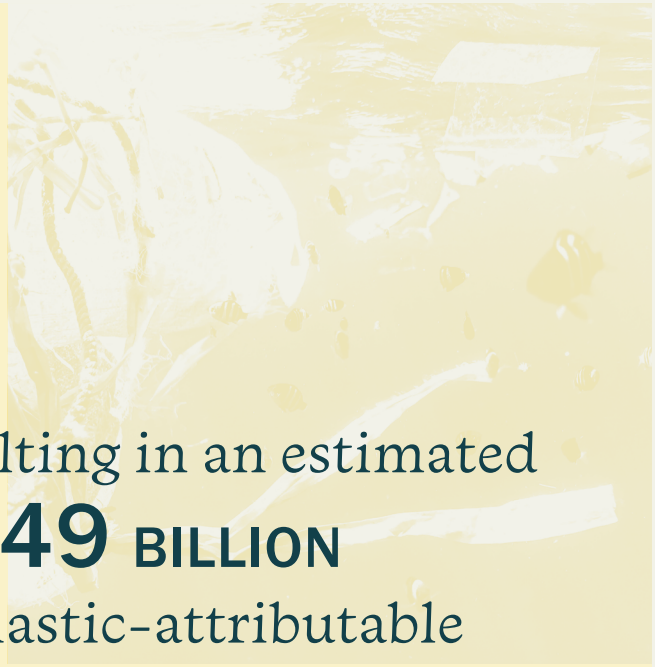



[212] California, Colorado, Nevada, New Mexico and Washington. Maine and North Carolina have privately funded grant programs.

Studies have found that microplastics are now found in nearly

**89%**

**OF PEOPLE**



resulting in an estimated

**$249 BILLION**

in plastic-attributable disease burden annually.

## Policy Context:

The evidence of the harm from pollutants, including plastics, PFAS, and heavy metals in our environment is mounting every day. Studies have found that microplastics are now found in nearly 89% of people,[213] resulting in an estimated $249 billion in plastic-attributable disease burden annually.[214] PFAS contaminants have been found in drinking water, soils, and food, and can increase risk of cancer, harm the immune system, decrease fertility, and cause developmental issues in children. Abandoned mines and orphaned wells that are not remediated can cause water pollution, including contamination by toxic heavy metals like lead, that results in cancer, nerve damage, and other health impacts.

It is therefore critical that these toxic substances be better regulated and that producers bear the cost of cleanup and environmental remediation. Reducing the production and use of single-use plastics through reuse and refill programs is a key strategy for limiting the health and economic impacts of plastic pollution. These programs will extend the usable life of plastic packaging through cleaning, reuse, and refilling systems, reducing the need for new virgin plastic production. Recycling remains an important part of reducing plastic pollution, particularly for materials that cannot be eliminated or reused, but current recycling systems are often limited by inconsistent collection, contamination, and products that are not designed to be recyclable. EPR will shift the responsibility for disposal or recycling from municipalities and communities to the producers themselves, reducing costs for communities and taxpayers and encouraging recycling and source reduction. Labeling PFAS chemicals with demonstrated risks as hazardous substances will expand the government's abilities to enforce cleanup of materials and recover costs associated with cleanup, ensuring that the polluter pays, not taxpayers. Accelerating research on other common PFAS and, where supported by the scientific evidence, regulating exposure to compounds such as PFHxS, PFNA, HFPO-DA (commonly known as GenX), and mixtures containing these chemicals should also be considered.

Further, there are an estimated 530,000 abandoned mines on federal lands alone, most of which are not tracked or monitored.[215] The *Infrastructure Investment and Jobs Act* (IIJA) established grant programs for states and Tribes to clean up abandoned hardrock mining and orphaned oil and gas well sites. An expansion of these programs and implementation with rigorous environmental standards will ensure remediation activities do not exacerbate pollution concerns.

[213] Lee, D. et al. (2024, December). Microplastic particles in human blood and their association with coagulation markers. *Sci Rep, 14*. https://www.nature.com/articles/s41598-024-81931-9.

[214] Trasande, L. et al. (2024, January). Chemicals Used in Plastic Materials: An Estimate of the Attributable Disease Burden and Costs in the United States. *Journal of the Endocrine Society 8*(2). https://pmc.ncbi.nlm.nih.gov/articles/PMC10783259/.

[215] United States Government Accountability Office. (2020, March). *Abandoned Hardrock Mines: Information on Number of Mines, Expenditures, and Factors That Limit Efforts to Address Hazards*, GAO-20-238. https://www.gao.gov/products/gao-20-238.

**BENCHMARK #4.2:**

# Empowered Native communities lead conservation efforts that preserve biodiversity and strengthen cultural heritage.



**INDIGENOUS PEOPLES HAVE BEEN STEWARDING THE LANDS THAT ARE NOW THE U.S. FOR MILLENNIA.** Conservation programs led by Native peoples demonstrably achieve biodiversity and ecosystem conservation outcomes superior to those achieved by other programs.[216] This section provides solutions for two key challenges:[217]

1. Exclusion of Native communities from ancestral lands
2. The undermining of Tribal sovereignty



[216] Riley, K., Nguyen, B., Jorgensen, M., & Mills, M. (2025, September). *Experts, not Obstacles: Indigenous Conservation Excellence and the Trap of Conservation at any Cost*. Harvard Project on Indigenous Governance and Development Native Nations Institute. https://ash.harvard.edu/wp-content/uploads/2025/10/Experts-Not-Obstacles-Indigenous-Conservation-FINAL-FINAL.pdf.

[217] Additional policy options regarding Tribal communities can be found in Chapter 2: Growing Rural and Tribal Economies and Chapter 3: Thriving, Affordable, Resilient Communities.



## Challenge – Exclusion of Native communities from ancestral lands:

Despite strong evidence that Indigenous stewardship improves environmental outcomes, Native communities are often excluded from decision-making and lack secure access to traditional land. They are also unable to access significant amounts of federal conservation dollars.

## Policy Options:

- Create, fund, and expand federal programs that support native stewardship of lands, waters, and species in a way that centers Tribes, Alaska Natives, and Native Hawaiians as ongoing stewards. Eliminate matching funds requirements as appropriate.
- **ESTABLISH TRIBAL WILDLIFE CONSERVATION AND RESTORATION ACCOUNTS AND THE TRIBAL CORRIDORS GRANT PROGRAM.**
- Expand co-management and co-stewardship agreements for public lands and establish mechanisms for reimbursing Tribes for management of lands through expansion of *Indian Self-Determination and Education Assistance Act* (ISDEAA) contracts/compacts.
- Support land return and relative return mechanisms for private lands and fund the use of conservation or cultural easements to empower Tribes to lead conservation while generating sustainable economic opportunities.

## Policy Context:

Federal spending focused on conservation should be directed to the most effective and efficient practitioners, which often are the Indigenous peoples themselves. Tribes and Native organizations should be eligible for all federal conservation and land stewardship grant programs with no or minimal matching fund requirements, and a new restoration account focused on Tribal conservation and restoration activities should be established.

Opportunities for co-management and co-stewardship should be expanded, including through directed resources and staff training for federal agencies on how to implement agreements when managing federal lands. Other mechanisms, including Good Neighbor Authority and stewardship contracting, can be expanded by removing barriers such as adjacency requirements to expand opportunities for Native stewardship of lands that impact federally managed areas. All co-management agreements in the future should include mechanisms for providing funds to Tribes for land management responsibilities, such as through the ISDEAA, which allows eligible federally recognized Tribes to assume the administration of some federal programs and receive federal funding for implementing covered programs and activities. ISDEAA should be expanded to include the U.S. Forest Service (USFS)[218] and the National Oceanic and Atmospheric Administration (NOAA).

While co-stewardship and co-management agreements allow for Tribal decision-making on federal lands, different mechanisms are required for returning lands under private control to Native peoples. A variety of land recovery opportunities exist to restore access and/or ownership of lands to traditional owners, ranging from the purchase of land to the establishment of cultural easements that allow access for traditional uses.

[218] The US Forest Service has ISDEAA authority related to Tribal Forest Protection Act proposals, but are not true self-governance programs.

**Challenge – The undermining of Tribal sovereignty:** Failure to honor the sovereign-to-sovereign relationship with Tribal Nations undermines self-determination and economic opportunity. This exclusion restricts Tribes' ability to lead conservation efforts, capture the economic benefits of stewardship, and sustain cultural and ecological resilience.

## Policy Options:

- Require Free, Prior, and Informed Consent (FPIC) in federal decision-making to ensure Tribal Nations and other recognized Indigenous communities have authority over projects affecting their lands, resources, and cultural heritage.
- Codify the incorporation of traditional ecological knowledge into federal decision-making and research, following the guidance for federal departments and agencies on Indigenous knowledge, and provide training for federal employees.
- Establish strong protections for Tribal data sovereignty, including a *Freedom of Information Act* (FOIA) Exemption for Tribal data.

## Policy Context:

A key aspect of recognizing the sovereignty of Tribal Nations is formal consultation regarding federal action. Integrating principles of FPIC, which will provide Tribes with the time, information, and resources to fully review and consent to federal actions impacting Tribal resources, will strengthen self-determination. Federal employees should receive training on federal trust responsibilities and FPIC principles for consultation. In addition, consultation and adherence to FPIC principles should be expanded beyond just formal decision-making to be an ongoing, collaborative process. All federal agencies should consider and include traditional ecological knowledge in federal decision-making. Federal use of Indigenous knowledge should adhere to FPIC principles, including compensation for knowledge when appropriate.

A critical impediment to full Tribal participation in federal decision-making, including consultations and use of traditional ecological knowledge, is the lack of protections for sensitive data held by Tribes. Such data includes location of cultural sites and religious or cultural practices. Tribal data should receive an exemption from FOIA, allowing Tribes to share sensitive data with the government to aid in decision-making. A similar exemption already exists for sensitive commercial and financial data. Until the exemption is provided, federal agencies, in compliance with FPIC, should be clear with Tribes about data management and access.

**BENCHMARK #4.3:**

# Nature is an economic asset, driving business growth and job creation.



**NATURE IS DECLINING AT AN UNPRECEDENTED RATE. OVER HALF THE WORLD'S GROSS DOMESTIC PRODUCT (GDP) IS AT RISK DUE TO THE RELIANCE OF BUSINESSES ON NATURE.**[219] This section provides solutions for three key challenges:

1. Ecosystem decline that weakens local economies
2. The need for broader adoption of private land stewardship
3. Limited conservation workforce pathways



[219] World Economic Forum. (2020). *The Future of Nature and Business*. https://www3.weforum.org/docs/WEF_The_Future_Of_Nature_And_Business_2020.pdf.

**Challenge – Ecosystem decline that weakens local economies:** Nature underpins business growth and job creation, yet it remains systematically undervalued and underinvested in as an economic asset. Declining ecosystems erode the resource base that supports local industries, reducing income, employment, and resilience.

## Policy Options:

- Advance the recreation economy by investing in durable, sustainable outdoor infrastructure that supports access, safety, and economic growth.
- Establish a federal beneficiary-pays conservation funding mechanism that requires a small, standardized revenue-based contribution from designated outdoor recreation sectors to be directed into a dedicated trust fund for habitat conservation and public access infrastructure.
- Establish policies and practices that align sustainable forest products development and ecosystem service markets with sound forest restoration and management.

## Policy Context:

The national recreation economy generated more than $1.3 trillion in economic activity and contributed nearly $700 billion to U.S. GDP in 2024, including not only traditional activities such as hiking, hunting, and boating, but related industries such as tourism, construction, and manufacturing.[220] Rapid interest in outdoor recreation since the COVID-19 pandemic has strained available recreation infrastructure, and communities that depend on outdoor recreation are typically more vulnerable to disasters like flooding and wildfires. Federal programs that invest in rural infrastructure should be broadened to prioritize projects that target recreation infrastructure for durability and resilience, such as trails, boat launches, and parks, as well as shoreline access points that expand equitable public access, improve visitor safety, and strengthen local and regional economic development tied to outdoor recreation. Permanent reauthorization of, and increased investment in, the *Great American Outdoors Act* Legacy Restoration Fund, with annual funding caps adjusted for inflation, will help address the billions of dollars in deferred maintenance needs across National Parks and other federally managed lands.

Efforts should be made to ensure that many of the benefits derived from the billion-dollar outdoor recreation industry are returned to the local communities and natural areas that support it. A federal beneficiary-pays mechanism, such as a small excise tax or special assessment that is tied to revenue, can be implemented on designated outdoor recreation sectors and directed into a dedicated trust fund for habitat conservation and public access infrastructure. This approach will align conservation funding with the industries that profit from outdoor recreation, similar to the support already provided by hunters and anglers, and maintain equitable access to outdoor spaces. Further recommendations on the outdoor recreation economy are discussed in Chapter 2: Growing Rural and Tribal Economies, Benchmark #2.5.

The forest products industry, which includes wood products, pulp and paper, and forestry and logging, has historically supported up to two million jobs in the United States but has seen declines in the last decade resulting from a changing marketplace and the COVID-19 pandemic.[221] Rebuilding a resilient forest products market derived from small-diameter timber and small branches, treetops, and other woody materials generated during forest restoration and wildfire risk reduction projects can support forest management activities that will decrease the risk of catastrophic fires, build resilience, and enhance the carbon storage capacity of trees. Federal policies and practices should embrace the climate-smart forestry paradigm for management, which incorporates ecological, economic, and social benefits, and includes sustainable logging of non-old growth and mature trees and forest products as critical components. Additionally, support for market-based approaches, such as certification programs for timber products that are sustainability managed and harvested, can help support consumers in making choices. Federal grant and loan programs can help refit and modernize lumber mills to process small-diameter timber, expand local processing capacity, and create durable markets for restoration-based forest products.



[220] Bureau of Economic Analysis. (2026, March). *Outdoor Recreation Economic Statistics, U.S. and States, 2024*. https://www.bea.gov/news/2026/outdoor-recreation-economic-statistics-us-and-states-2024.

[221] Poudel, J. & Dahal, R. (2025, March). A comprehensive look at the forest products industry's economic contribution to the United States: Pre- and post-COVID analysis. *Forest Policy and Economics, 172*. https://www.sciencedirect.com/science/article/abs/pii/S138993412500019X.

## Challenge – The need for broader adoption of private land stewardship:

The absence of strong incentives and accessible technical assistance is slowing the uptake of stewardship practices on private lands, where much of the nation's biodiversity resides. This gap not only limits ecosystem health and resilience but also constrains economic opportunities for landowners and rural communities.

### Policy Options:

- Reward landowners for proactive conservation actions that deliver measurable benefits to ecosystems and reduce long-term risk, such as actions that stabilize aquifers, protect surface water flows, protect endangered species, or reduce wildland fire risk.
- Expand grants and tax incentives to support private land conservation, enabling land trusts, easements, and other tools to generate measurable ecological and economic benefits.
- Increase access to federal programs by revising matching fund requirements, including reducing or eliminating matching requirements for rural, small, and low-income communities or expanding the definition of what support qualifies as a match.
- Support extension programs through Land Grant and Sea Grant colleges to provide technical support and knowledge sharing, helping landowners and businesses adopt best practices.

### Policy Context:

Expansion of conservation on private lands is critical to meeting biodiversity goals. Voluntary programs that provide financial incentives for private landowners to conserve or steward their lands can enhance the uptake of practices that benefit land. Programs like payments for environmental services should be expanded to include non-working and undeveloped lands. Expansion of easements to include permanent land stewardship for specific ecosystems services, such as ground water easements or wildlife corridors, can incentivize non-agriculture private landowners to invest in land stewardship that benefits the preservation of ecosystem services. Programs should also invest in transparency to ensure a real return on investment from federally supported private land conservation programs. Creation of markets for ecosystem services and nature, expanded on in Benchmark #4.7, will also spur private investment in conservation and land stewardship.

Rural, small, and low-income communities are often left behind by federal grant-making programs due to the inability to meet matching requirements. In addition to lowering or eliminating match requirements, federal grant programs should look to broaden the definition of what is included as matched funds, such as incorporating spending on planning or long-term maintenance for a project or allowing for financing to meet match requirements.

Cooperative extension programs offered via the Land Grant and Sea Grant college programs are critical pathways for providing technical support for adoption of sustainable practices. Extension programs exist in all 50 states and territories, making them well suited to provide information to Americans. Land Grant extension services focus on agricultural lands (which includes forests and ranches), but expansion to include providing technical capacity to owners of non-agricultural lands should be considered. Sea Grant programs also work with coastal communities and businesses on implementing sustainable practices.

## Challenge – Limited conservation workforce pathways: Insufficient job training programs and unclear career pathways in conservation and stewardship limit workforce participation and growth. This shortfall slows the expansion of nature-based solutions and leaves potential workers without access to quality employment.

### Policy Options:

- Establish workforce development programs tied to land restoration and stewardship that provide a living wage and workforce training offerings designed to attract interest from diverse labor markets.
- Dedicate assistance for upskilling programs at high schools, community colleges, technical schools, Tribal colleges, Historically Black Colleges and Universities (HBCUs), and Hispanic-Serving Institutions (HSIs), and expand apprenticeship programs to develop a skilled conservation and restoration workforce.
- Require all federally funded restoration and resilience projects to ensure fair compensation, support local labor markets, and strengthen the economic benefits of conservation and resilience investments.

### Policy Context:

Conservation-focused workforce programs typically offer low wages and narrow career pathways. While usually targeted toward young adults, workforce development programs should not have age-related restrictions. An increased focus on soft skills, including project management, teamwork, and problem solving, will increase the marketability of participants upon completion of the program. Workforce development programs should also be tied to investments in rural communities to ensure affordable access to housing, childcare, and transportation to support workers.

Another way to increase worker opportunities around land management is to increase awareness and offer opportunities to obtain required qualifications to work in the field. Investments in conservation and stewardship education for high school and college students as well as non-traditional students will increase the pipeline for conservation-related careers.

BENCHMARK #4.4:

# Biodiversity is safeguarded as both an intrinsically valuable and a foundation of sustainable economic growth.

**THE UNITED STATES FACES GROWING BIODIVERSITY CHALLENGES AS SPECIES DECLINE, HABITATS ARE DEGRADED, AND RESTORATION NEEDS OUTPACE AVAILABLE RESOURCES.** Strategic investments in conservation can help reverse these trends and ensure that natural systems continue to provide the ecological, economic, and community benefits upon which people and industries depend. This section provides solutions for three key challenges:

1. Unprecedented global decline of biodiversity
2. Fragmented efforts that hinder biodiversity protection
3. Limited native seed supply



## Challenge – Unprecedented global decline of biodiversity: Global biodiversity is declining at an unprecedented rate, undermining ecosystem stability and resilience.

### Policy Options:

- Establish as federal policy that protecting biodiversity and safeguarding essential ecosystem services must be treated as a core national security imperative.

### Policy Context:

The United States is in the midst of a biodiversity crisis. **BIODIVERSITY IS CRITICAL TO THE BASIC FUNCTIONS OF OUR COUNTRY AND ECONOMY, UNDERPINNING OUR FOOD SYSTEM, SUPPORTING HUMAN HEALTH, AND BOLSTERING ECONOMIC GROWTH.** Biodiversity and ecosystems also mitigate impacts from natural disasters such as flooding and hurricanes, an increasingly important service due to the rising number of billion-dollar disasters. Loss of biodiversity can increase the risk of infectious disease transmission and future pandemics by disrupting ecosystems in ways that favor species more capable of carrying and spreading pathogens to humans. **IT IS THEREFORE IMPERATIVE THAT THE NATION, IN ORDER TO PROTECT AND DEFEND ITS CITIZENS, PRIORITIZE SAFEGUARDING BIODIVERSITY AND RELATED ESSENTIAL ECOSYSTEM SERVICES.** Although the U.S. has enacted landmark conservation statutes such as the *Endangered Species Act* (ESA), these protections are frequently weakened by broader economic and land-use policies that drive biodiversity loss. Individual laws alone largely do not set national policy directives. Treating biodiversity loss as a comprehensive national security threat is the kind of intervention and dedication that is needed now to ensure that our government prioritizes the safeguarding of biodiversity.

## Challenge – Fragmented efforts that hinder biodiversity protection: Lack of coordinated conservation, restoration, and sustainable resource management programs across all governance levels inhibits the ability of actors to address the decline in biodiversity.

### Policy Options:

- Provide increased funding to states, Tribes, and territories to implement State Wildlife Action Plans (SWAPs) and Tribal wildlife programs.
- Increase coordination across agencies, states, and Tribes and fund wildlife disease planning and response efforts.
- Strengthen support for fighting invasive species; improve coordination across federal, state, Tribal, and territorial agencies; and provide long-term management capacity.
- Expand investment in improving wildlife corridors to maintain and improve wildlife movements across public, private, and Tribal lands.

### Policy Context:

Conservation activities are inherently local and must reflect local ecological conditions to be successful. It is states, Tribes, and territories that are best situated to enact appropriate conservation and restoration projects. Increased funding should be directed to states, Tribes, and territories to carry out wildlife action plans and programs. Tribes, in particular, receive little federal funding. Only around $6 million per year is currently available for all federally recognized Tribes through the Tribal Wildlife Grants competitive grant program, despite Tribal-led conservation programs being more successful and cost-efficient (see further discussion above in Benchmark #4.2).

Emerging infectious diseases that cross over from wildlife can have a profound impact on our country. It is estimated that three-quarters of emerging diseases are spread from animals, often in areas with degraded ecosystems.[222] Increased coordination around proactive measures to monitor and track human, animal, and environmental health could detect emerging diseases up to eight months earlier than current measures. Similarly, non-native introduced species, commonly called invasive species, wreak both ecological and economic havoc on the environment. Invasive species significantly harm the U.S. economy, with costs recently estimated at around $21.08 billion annually from resource damage/loss and management costs.[223] Increased coordination around policy and programs can aid in early detection and more efficient rapid response.

Invasive species significantly harm the U.S. economy, with costs recently estimated at around $21.08 billion annually from resource damage/loss and management costs.

Infrastructure, energy, and residential development can fragment species habitat, often disrupting migration corridors that are essential for species to find food and reproduce. Protection of migration corridors provides connections between habitats for species, improving ecological outcomes while also increasing safety for communities and bolstering rural economies. Wildlife corridors and crossings located near and across infrastructure, such as highways, can decrease animal-vehicle collisions (AVCs), which cost $8 billion and result in tens of thousands of injuries and deaths each year.[224] Enhancing wildlife connectivity is also critical for maintaining healthy environments that underpin much of the recreation economy (see further discussion above in Benchmark #4.3).

[222] The Lancet. (2024, October). Biodiversity loss: a health crisis. *404*(10463). https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(24)02350-X/fulltext.

[223] Fantle-Lepczyk, J. et al. (2022). Economic costs of biological invasions in the United States. *Science of the Total Environment, 806*(3). https://www.sciencedirect.com/science/article/pii/S0048969721063968.

[224] Zawad, M., Almannaa, M., & Alkahtani, K. (2025, September). Investigating factors influencing fatalities and injuries in animal-vehicle crashes using a random parameters logit model and ensemble machine learning approaches. *PLoS One 20*(9). https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0331197.



**Challenge – Limited native seed supply:** The lack of a robust, regionally appropriate native seed supply limits the ability to restore ecosystems, maintain biodiversity, and support climate-resilient landscapes. This shortage also constrains the growth of restoration economies and the long-term economic viability of land management efforts.

## Policy Options:

- Direct federal land agencies to publish a national native seed supply and demand assessment and establish a coordinated outreach and technical assistance program to improve awareness among agencies, states, and restoration practitioners of the need to expand native seed supply chains for large-scale ecosystem restoration.
- Invest in the National Native Seed Strategy and support Tribal seed conservation efforts that protect and cultivate traditional, indigenous, and native plant seeds.
- Invest in public and private nursery production capacity to ensure there are enough saplings of native and ecologically appropriate tree species for large-scale restoration and reforestation efforts.
- Require the use of locally adapted native plant materials in restoration and management of public lands and buildings by all federal agencies, as appropriate.

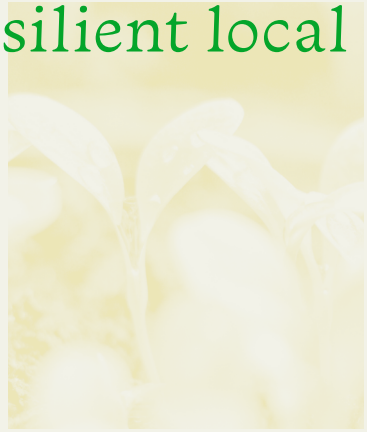
## Policy Context:

Native plants are essential to the biodiversity and ecosystem health of our environment. Plants are the foundation on which natural systems are built, and animals are frequently specially adapted to utilize native plants. Long-term, durable restoration efforts of lands, such as forests after wildfires, require locally adapted plant species for the best chance of success. However, the supply of native seeds available for restoration activities is vastly below levels needed. For example, burned area rehabilitation efforts by the Bureau of Land Management (BLM) require on average 2.4 million pounds of seeds but can range up to 7.5 million pounds.[225] Collection of native seeds cannot meet the needs of land managers. Production of seeds can take years, but they also have a short shelf-life once mature. Private production of native seeds is frequently viewed as a risky investment due to the uncertainties present in production of plant matter. Establishing grant programs or other vehicles to provide capital to private nurseries and supporting the market for seeds by requiring the use of native seeds for all federal planting programs, not just by the U.S. Department of the Interior (DOI) and USFS, will provide a stronger, more stable market signal to increase private production.

[225] National Academies of Sciences, Engineering, and Medicine. (2023). *An Assessment of Native Seed Needs and the Capacity for Their Supply: Final Report*. https://doi.org/10.17226/26618.

BENCHMARK #4.5:

# Our lands are managed for balanced multi-use, maximizing ecosystem services that drive resilient local economies.



**U.S. PUBLIC LANDS ARE MANAGED UNDER A MULTI-USE MANDATE INTENDED TO BALANCE CONSERVATION, RECREATION, AND RESOURCE USE.** In practice, this balance is not consistently achieved. This section provides solutions for two key challenges:

1. Fragmented land management
2. Outdated laws that enable public resource exploitation



**Challenge – Fragmented land management:** Fragmented and inconsistent management of public lands risks degrading natural systems and limiting long-term environmental and economic outcomes.

## Policy Options:

- Provide federal agencies with a clear mandate to prioritize ecosystem health in management and decision-making regarding federal lands and waters. Other uses, including recreation, timber, drilling and mining, renewable energy, hunting, and fishing should be managed in a way to support the goal.
- Ensure public agencies make clear, reliable, and efficient decisions to plan, site, and permit land uses, and that infrastructure investments focus on already disturbed or heavily used areas to reduce environmental impacts.
- Clarify that land use plans are not subject to the *Congressional Review Act* (CRA).
- Implement landscape-level planning to optimize the balance of conservation, recreation, and development on public lands.
- Implement outcome-based metrics, such as restored forest health, improved water quality, improved carbon sequestration, etc., and consistent, interoperable data systems across management agencies to measure the real impacts of conservation actions on biodiversity and economic systems.

## Policy Context:

Federal law requires that public lands, particularly those managed by BLM and USFS, must be managed for multiple uses and sustainable yield. This includes managing in a way that "will best meet the present and future needs of the American people" and "to conform to changing needs and conditions" for "the long-term needs of future generations."[226] Given the climatic changes impacting lands, including increasing drought, losses in agriculture and forest lands, and more frequent and severe storms, now is the time to adjust the mandate for managing lands for the long-term needs of future generations by prioritizing ecosystem health and uses that support that goal.

Agency decision-makers should invest in early consultation, coordination, and planning to make clear, reliable, and efficient decisions that allow for development without jeopardizing critical species or ecosystem services. Frameworks such as Climate-Smart Siting allow for consideration of both present and future conditions due to climatic changes and emphasize the importance of meaningful engagement with communities.[227] When looking to site new infrastructure, including oil and gas, renewable energy, and mineral development, land managers should, whenever possible, focus on permitting for already disturbed or heavily used areas first, rather than opening up new areas for development that are used for recreation or conservation.

Once completed, land use plans provide a foundation to guide agency decision-making in that area. Until recently, these plans were not considered rules or subject to the CRA. The recent ruling by the U.S. Government Accountability Office (GAO) and subsequent disapproval of resource management plans have led to uncertainty about the agency planning process, including making it unclear if agencies have the ability to issue permits for any activities on these lands. Crucially, any rule overturned by the CRA prohibits agencies from issuing a substantially similar rule in the future, raising the possibility that federal land management agencies can no longer produce any land use plans for those impacted areas.

Landscape-level planning is a framework for looking at larger systems, including the plants, animals, and human communities together. Working at a landscape scale can help decision-makers prioritize where and when to deploy different uses of land for the best ecological and economic outcomes. Land management policies should be evaluated using outcome-based metrics that measure results and real-world impacts.

Land use planning and management that focuses on individual parcels or specific species cannot adequately account for the full complexity of an ecosystem. Landscape-level planning is a framework for looking at larger systems, including plants, animals, and human communities together. Working at a landscape scale can help decision-makers prioritize where and when to deploy different uses of land for the best ecological and economic outcomes. Land management policies should be evaluated using outcome-based metrics that measure results and real-world impacts. This shift will grant federal land managers flexibility in choosing the best management practices to achieve the desired outcome, rather than focusing on the methods themselves. For example, a forest manager will evaluate change in wildfire risk, rather than only focusing on acres treated, ensuring that the most effective measures are taken, increasing efficiency and decreasing long-term costs.

The four main federal land management agencies – BLM, USFS, U.S. Fish and Wildlife Service (FWS), and National Park Service (NPS) – manage 650 million acres of federal land. Given the need for landscape level approaches to more efficiently achieve biodiversity and economic outcomes, and the patchwork nature of land ownership, especially in the Western U.S., it is imperative that data from all four bureaus be interoperable.

[226] Vann, A. (2023, June). *Federal Land Management: When "Multiple Use" and "Sustained Yield" Diverge*. Congressional Research Service https://www.congress.gov/crs-product/LSB10982.

[227] Ashraf, U., Morelli, T., Smith, A., & Hernandez, R. (2024, October). Climate-Smart Siting for renewable energy expansion. *iScience, 27*(10). https://www.sciencedirect.com/science/article/pii/S2589004224018911.

## Challenge – Outdated laws that enable public resource exploitation:

Outdated laws governing extractive industries on public lands allow private companies to access and exploit public resources while providing inconsistent and often insufficient returns to local communities.

## Policy Options:

- Modernize federal fossil fuel leasing by replacing fixed royalty rates with a market-linked royalty system combined with rate reductions for environmentally beneficial practices.
- Modernize outdated federal mining laws to ensure mining interests can be fairly balanced with other federal land uses and respect Tribal sovereignty.
- Institute mandatory, full funding for the Payment in Lieu of Taxes (PILT) program and explore opportunities to expand and update PILT to provide premiums for conservation or effective stewardship of local lands.
- **ESTABLISH A PERMANENT ENDOWMENT FUND FOR REVENUE SHARING FROM FEDERAL LEASING (INCLUDING FROM RENEWABLE ENERGY) TO DECREASE VOLATILITY AND ENSURE LONG-TERM WEALTH FOR TRIBES, STATES, AND LOCAL GOVERNMENTS.**
- Expand use of restoration and mitigation leases to restore and protect our degraded public lands, and allow developers to offset their impact.

## Policy Context:

Current federal laws on mining and drilling on public lands, some of which date back to the 1870s, give mining and drilling companies large latitude to extract wealth from lands at bargain prices with little to no return to taxpayers, who are often left on the hook for costs related to cleanup and environmental damages. Low rents allow lease holders to maintain nonproducing leases, preventing other uses that may benefit local communities or ecosystems. The system for leasing public lands for extractive industries such as oil and gas production should be modernized, switching from a fixed-rate system to one tied to market rates of commodities. The hardrock mining claims system should likewise be updated to ensure Tribes, communities, and land managers have input into location and mine operations, and a royalty fee should be implemented to ensure cleanup and fair return. This will ensure that the government and the public receive a fair share of revenue during booms and insulate the industry during sharp drops in market prices, preventing unemployment. To incentivize environmentally beneficial practices, the rate could be reduced based on implementation of practices with verified environmental outcomes, such as reduction in emissions, lower water usage, and site restoration activities.

Rural communities located near public lands surrender tax revenue that is used to support critical infrastructure like education, waste disposal, and law enforcement. The PILT program provides payments to counties to offset the loss of taxes. PILT is currently part of the discretionary budget, subject to annual appropriations, and therefore not guaranteed. With inflation continuing to increase costs, it is critical for rural communities to have certainty around PILT payments that come from mandatory funding.

Rural communities near federal lands also rely on those areas as economic drivers, supporting tourism and outdoor recreation businesses. These gateway communities are therefore motivated to ensure the continued ecological success of federal lands and have often taken measures on non-federal lands to enhance biodiversity. PILT-like payments could be made to communities for conservation actions that improve the quality of local lands, such as a premium per acre for areas effectively managed or left open as green space.

States and rural counties also receive funding via revenue sharing for royalties and leasing revenue from commercial activity on federal lands, including timber harvests, grazing, oil and gas drilling, and fee-based recreational uses. These payments are volatile and often subject to changes due to global market conditions. Establishing a permanent fund with receipts from commercial activities, including new renewable energy development, will create certainty in payments received and help communities reliant on oil and gas revenue to refocus on new industries without economic harm. For instance, in FY2025, oil and gas revenue exceeded $7.5 billion.[228] An increase in royalty payments of less than 5% would, therefore, generate an additional $320 million that could be returned directly to states and rural communities. Further supporting efforts to help states find ways to minimize their reliance on boom-and-bust cycles of fossil fuels as part of their budget will allow for more stable projections and economic growth.

Restoration and mitigation leases are mechanisms to allow land to be leased for activities that restore land or offset the impacts of a particular action. These types of leases allow for non-extractive revenue generation on public lands, can support the restoration economy that is worth $25 billion annually,[229] and ensure the continued receipt of valuable ecosystem services.



[228] Lexie, R. (2026, February). *Revenues and Disbursements from Oil and Natural Gas Leases on Onshore Federal Lands.* Congressional Research Service. https://www.congress.gov/crs-product/R46537.

[229] Federal Reserve Bank of Boston. (2016, June). *The Economic Impacts of the US Ecological Restoration Sector.* https://www.bostonfed.org/publications/communities-and-banking/2016/summer/the-economic-impacts-of-the-us-ecological-restoration-sector.aspx.

BENCHMARK #4.6:

# Healthy, resilient, and sustainably managed ocean and coastal ecosystems support growing economies.



**SUSTAINABLY MANAGED OCEAN AND COASTAL ECOSYSTEMS ARE ESSENTIAL TO BOTH ECOLOGICAL RESILIENCE AND ECONOMIC PROSPERITY.** They sustain industries and communities that depend on healthy marine systems for food, jobs, and commerce. Today, the U.S. ocean economy is worth $511 billion annually.[230] This section provides solutions for one key challenge:

1. Economic risk of neglecting ocean health



[230] National Oceanic and Atmospheric Administration. (2025, June). *U.S. marine economy continues to empower American prosperity*. https://www.noaa.gov/news-release/us-marine-economy-continues-to-empower-american-prosperity.

**Challenge – Economic risk of neglecting ocean health:** Degradation of ocean ecosystems is putting significant economic sectors at risk, including fisheries, tourism, and coastal protection. Without stronger management and investment, declining ocean health will continue to erode livelihoods and increase vulnerability for coastal communities.

## Policy Options:

- Establish climate adaptation as a priority for ocean management, including fisheries and aquaculture.
- Support development and deployment of technology and observational infrastructure to ensure effective management and stewardship of ocean resources.
- Implement and expand the *Coastal Zone Management Act* (CZMA) and other frameworks to help states and local communities protect wetlands.
- Broaden the Coastal Barrier Resources System (CBRS) inland to better protect vulnerable coastal habitats and discourage high-risk development in areas increasingly exposed to coastal hazards.
- Establish and effectively manage marine protected areas (MPAs) with the highest levels of protection possible with an emphasis on underrepresented geographies and marine ecosystems.
- Establish a preventative pause on permitting for deep sea mining until sufficient information for a full risk evaluation is available.

## Policy Context:

Critical economic sectors, including tourism and recreation, fisheries and aquaculture, national defense, and marine transportation, depend on a healthy and functioning ocean ecosystem that is under critical threat due to changing climatic conditions. It is therefore imperative that ocean management activities, including fisheries, energy production, and conservation, take a climate-informed approach to ensure continued growth in the ocean economy.

Effective management requires information and data to guide decision-makers to optimal outcomes. The ocean is undergoing fundamental alterations to its chemistry and biology, necessitating quick, accessible observations and data for dynamic management that responds to on-the-ground (or in-the-water) conditions. Furthermore, robust observational infrastructure and data are essential to continuing to grow the ocean economy, supporting scientists, end users, and policymakers. Commercial businesses that deliver ocean observations and measurements as a service are estimated to generate revenue of up to $58 billion annually.[231]

**NEARLY 40% OF THE U.S. POPULATION OR ROUGHLY 129 MILLION AMERICANS, LIVE IN COASTAL AREAS. CZMA PROVIDES SUPPORT FOR STATES AND TERRITORIES TO MANAGE COASTAL RESOURCES. THIS INCLUDES CRITICAL COASTAL HABITATS LIKE WETLANDS AND MARSHES THAT PROVIDE A RANGE OF BENEFITS VALUED AT AROUND $90 MILLION A YEAR, AS WELL AS COASTAL PROTECTION, HABITAT FOR SPAWNING FISH, AND RECREATIONAL OPPORTUNITIES.[232]** Federal grants established through CZMA should be targeted toward helping communities protect valuable wetland habitats as a preemptive measure to guard against storm surge, bolster fish populations, and grow tourism and recreation opportunities.

TheCBRS, established by the *Coastal Barrier Resources Act* (CBRA), identifies areas of private land where federal funding or assistance for development is prohibited. CBRA takes a free-market approach to conservation and disaster resilience by safeguarding vital coastal areas and should be broadened to include land further inland to account for changing coastal landscapes. A 2019 review found that CBRA had reduced federal disaster spending in coastal areas by $9.5 billion between 1989 and 2013 and was forecasted to save between $11 billion and $108 billion by 2068.[233]

A key tool for bolstering ocean health is establishing MPAs, protected ocean areas exempt from commercial activity to allow species to recover. In addition to meeting globally endorsed targets of protecting at least 30% of marine territory, MPA designations should endeavor to provide the highest level of protection possible in order to achieve the greatest ecological outcomes. This will not only bolster biodiversity but also enhance ocean economies. MPAs have been shown to boost tourism and increase the size and number of commercially valuable fish stocks. The U.S. currently protects around 26% of its waters in MPAs.[234] Yet, the spatial layout of these areas is not even, with 99% of highly or fully protected areas occurring in the Pacific Islands, leaving other critical habitats unprotected. There is an urgent need for increased protections in state and nearshore waters to effectively mitigate the impacts of human activities.

Deep sea mining seeks to extract critical minerals from the seafloor in the deep ocean. International standards for safety and environmental protection have stalled at the International Seabed Authority (ISA), prompting the U.S. to move ahead with permitting for seabed mining without international safeguards. The potential effects of seabed mining are still being researched, with early indications that impacts could range from species extinction to harming commercially valuable fisheries. Therefore, using a precautionary approach, permitting for deep sea mining both within U.S. waters and in areas beyond national jurisdiction (or the high seas) should be paused until sufficient information to evaluate the risks has been collected.

[231] Rayner, R., Gouldman, C., & Willis, Z. (2018, November). The Ocean Enterprise - understanding and quantifying business activity in support of observing, measuring, and forecasting the ocean. *Journal of Operational Oceanography, 12*. https://repository.library.noaa.gov/view/noaa/59389.

[232] Bilkovic, D. et al. (2025, December). Valuing present and future benefits provided by coastal wetlands and living shorelines. *Nature-Based Solutions, 8*. https://www.sciencedirect.com/science/article/pii/S2772411525000321.

[233] Coburn, A. & Whitehead, J. (2019, March). An Analysis of Federal Expenditures Related to the Coastal Barrier Resources Act (CBRA) of 1982. *Journal of Coastal Research, 35*(6). https://bioone.org/journals/journal-of-coastal-research/volume-35/issue-6/JCOASTRES-D-18-00114.1/An-Analysis-of-Federal-Expenditures-Related-to-the-Coastal-Barrier/10.2112/JCOASTRES-D-18-00114.1.short.

[234] Sullivan-Stack, J. et al. (2022, May). A Scientific Synthesis of Marine Protected Areas in the United States: Status and Recommendations. *Solutions for Ocean and Coastal Systems, 9*. https://www.frontiersin.org/journals/marine-science/articles/10.3389/fmars.2022.849927/full.

BENCHMARK #4.7:

# Nature is fully accounted for in economic systems and fiscal decision-making.



**NATURE IS CRITICAL TO THE WEALTH, HEALTH, AND WELL-BEING OF OUR COUNTRY AND PEOPLE.** But the value we derive from nature is frequently forgotten in policymaking, especially when focused on return on investment (ROI) or other economic-based decision tools. This section provides solutions for one key challenge:

1. Failure to adequately value nature



**Challenge – Failure to adequately value nature:** Economic systems routinely undervalue or ignore nature, leading to decisions that degrade natural resources and undermine long-term prosperity. The federal government's failure to fully use robust valuation frameworks limits the ability of policymakers to fully account for nature's contributions.

## Policy Options:

- Direct the Chief Statistician of the United States within the Office of Management and Budget (OMB), U.S. Department of Commerce, and other members of the Federal Commission on Statistical Methodology (FCSM), supported by the White House Office of Science and Technology Policy (OSTP) and Council of Economic Advisors, to finalize and implement standardized natural capital accounting (NCA) and ecosystem service valuation frameworks across the federal government.
- Require federal agencies and incentivize state and local authorities to incorporate natural capital and ecosystem service values into long-term economic development, infrastructure, and land-use planning.
- Establish a Bureau of Environmental Statistics to collect, standardize, and publish environmental and natural capital data to support federal decision-making and economic accounting.
- Direct the Bureau of Economic Analysis (BEA) to maintain and expand existing satellite accounts and develop additional satellite accounts for nature-dependent sectors such as forestry, fisheries, agriculture, and tourism.
- Establish the Natural Capital Accounting Standards Board to develop consistent frameworks for nature-related financial disclosure, risk assessment, and accounting standards; alternatively direct the U.S. Securities and Exchange Commission (SEC) to develop guidelines.
- Direct OMB to reinstate and use guidance on ecosystem valuation.
- Update the Congressional Budget Office's (CBO) scoring methodology to better reflect the economic costs and benefits of nature. Federal funding for projects and grant programs should include added scoring for conservation considerations.
- Create a Tax Code for Nature to provide long-term financing models for conservation and stewardship.
- Expand the use of public-private partnerships and blended finance models to support conservation and stewardship projects on private lands.

## Policy Context:

**TO MORE ACCURATELY UNDERSTAND THE IMPACT OF POLICIES, WE NEED TO IMPLEMENT A ROBUST SYSTEM FOR ACCOUNTING FOR NATURE, BOTH THE ECOSYSTEM SERVICES WE RECEIVE AND THE NON-MARKET VALUE OF NATURE. NCA IS THE FOUNDATIONAL FIRST STEP THAT PROVIDES A FRAMEWORK TO MEASURE AND REPORT ON NATURAL CAPITAL. IT LOOKS BEYOND THE VALUE OF EXTRACTIVE USES OF NATURE TO INCLUDE THE ROLE OF ECOSYSTEMS IN SUPPORTING HUMAN WELL-BEING. NCA ALSO ALLOWS FOR TRANSLATION OF NATURE AND NATURE-BASED SERVICES INTO WELL-KNOWN ECONOMIC MEASURES SUCH AS GDP AND TO EFFECTIVELY DETERMINE TRADEOFFS WITH OTHER FORMS OF WEALTH.** The System of Environmental-Economic Accounting (SEEA) is an internationally recognized framework for implementing NCA. Infrastructure, like dams and water mains, are treated as long-term capital assets in accounting. Ecosystems that provide critical infrastructure to communities should be treated similarly.

A critical component of NCA is sufficient data to track ecosystem service demand and flow. **ESTABLISHING A BUREAU OF ENVIRONMENTAL STATISTICS WILL HELP GENERATE CONSISTENT, LONG-TERM ENVIRONMENTAL DATA NEEDED TO SUPPORT NATURAL CAPITAL ACCOUNTING.** The use of satellite accounts, like the Outdoor Recreation Satellite Account and the Marine Economy Satellite Account, allows for the measurement of non-industry economic sectors. These types of accounts can signal changes in natural capital and, by tracking nature-dependent sectors, demonstrate the importance of measuring nature's input into these industries. However, satellite accounts do not directly measure natural capital or the input of ecosystem services to these sectors. To maintain integrity, a financial accounting standards board focused on nature should be established to promulgate reporting standards and disclosure requirements for nature-related risk.

With a system to provide economic statistics on the value of nature and ecosystem services, natural capital must be integrated into federal policy development and implementation, especially for policies that are not inherently environmental but will impact natural resource availability or function. For example, NCA can be useful for identifying tradeoffs or conflicts between two land uses. Use of natural capital will be especially valuable in evaluating alternatives under the *National Environmental Policy Act* (NEPA) and the ESA and for natural resource damage assessments. OMB should be directed to reinstate and implement guidance on ecosystem services valuation contained in the 2023 version of OMB Circular 4-A on regulatory analysis, Circular 4-94 on benefit-cost analysis, and associated documents.

Similarly, CBO produces a cost estimate for bills that are considered by Congress. While some progress has been made for CBO to incorporate the cost of climate change or loss of ecosystem services in estimates, there is no consistent,




verifiable approach for evaluating the benefits and costs on the national budget resulting from changes in nature.

While federal dollars are crucial to funding restoration and conservation of nature, they are unlikely to be able to meet the full need. Creating a tax code that prioritizes nature and developing new conservation finance models that center nature are critical to provide long-term, sustained funding for conservation.

Tax code changes include new and expanded tax credits and deductions to landowners for implementation and maintenance of land management solutions that provide confirmed, preferred ecological outcomes. Tax incentives could also be provided for the implementation of nature-based climate solutions, helping reduce the high upfront costs that may be a barrier to projects.

With strong accounting measures for nature, there are emerging opportunities for nature finance to support biodiversity and the environment, including nature-based bonds, credits, and the development of natural-asset companies. Halting or reversing biodiversity loss could be worth an additional $10 trillion in business value in less than five years,[235] representing a huge investment opportunity. But harnessing this wealth will require sustained efforts to create ideal enabling conditions, such as de-risking investments or supporting a pipeline of investable projects.

[235] World Economic Forum. (2025, September). *Finance Solutions for Nature: Pathways to Returns and Outcomes*. https://reports.weforum.org/docs/WEF_Finance_Solutions_for_Nature_2025.pdf.

# Secure American Energy Future



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CHAPTER 5:

# Cheap, Abundant, and Clean American Energy for All

The United States is blessed with abundant and affordable clean energy, and every American should benefit from these shared resources.

Access to energy unlocks opportunity for all communities and increases economic competitiveness for the country. In a thriving economy, Americans can afford energy bills, the electric grid is upgraded and expanded, the United States leverages the renewed electric grid to compete for the industries of the future, and our access to energy is well-protected against climate-fueled wildfires, extreme weather, and cyberthreats.

In this thriving economy, the electric grid serves as the backbone, enabling life-saving medical treatments, keeping families safe at home, and empowering businesses to sustain communities across the country. Ideally, the U.S. electric grid underpins energy affordability by enabling easy interconnection of new power generation for delivery across the country, ensuring reliability, and energizing the industries of the future. Currently, we are facing two simultaneous challenges. First, our grid infrastructure is aging and needs upgrades to remain reliable in the face of climate-fueled extreme weather and wildfire. At the same time, demand for electricity is surging due to data centers supporting the generation of artificial intelligence (AI), increased manufacturing, and electrification of vehicles, homes, and some industrial processes. **TOGETHER, AN AGING GRID AND SURGING DEMAND ARE DRIVING UP COSTS FOR EVERYDAY AMERICANS.**

Forward-thinking policies are essential to meet the moment and deliver on the economy promised to all Americans. We can increase affordability without stifling growth by improving federal and state processes, incorporating novel approaches such as expanded grid and load flexibility, and leveraging technological advancements in grid digitalization and intelligent systems for grid efficiency, flexibility, and resilience. Consumer-focused policies for the energy sector can lower costs for families while also creating an attractive environment for manufacturing investments and local economic development.

There are a few underlying assumptions of this chapter. As described in the introduction, this policy blueprint does not retrace familiar ground covering all the bedrock policies that have been proven to work. Nor does it exhaustively list the many important existing programs that could achieve even more impact with increased funding. This policy blueprint begins from the conviction that public-private partnerships require the government to act in good faith and that agencies must act in accordance with their Congressional mandates, restore financial awards that were arbitrarily canceled, and authorize infrastructure permits consistent with the law. Building on that foundation, this blueprint adds to the current policy conversation by highlighting new ideas and elevating areas of consensus for immediate action to resolve U.S. economic challenges.

Moreover, this chapter builds on the current regulatory system for the U.S. electric grid, which evolved out of the unique circumstances of U.S. history. Some of the policies described below expressly aim to advance the public interest in affordability. Other policies focus on increasing the effectiveness of market structures, which should lower costs as well.

In the United States, the balance between state, regional, and federal authority over electricity has changed over time. Currently, there are inefficiencies created by overlapping areas of jurisdiction. This chapter focuses on opportunities for federal action to help meet affordability needs, but it does not attempt to draw bright lines between federal and state jurisdiction. Instead, the federal government must collaborate with states and regional partners to optimize utility regulation for the public interest.

Finally, this chapter alludes to the need to modernize wholesale power markets to leverage the capabilities of new technologies and advance the public interest. Deeper engagement by policymakers is needed on this issue, not least because the independence of federal agencies is no longer something to take for granted. A fulsome discussion would take up much of this chapter so this policy blueprint mostly outlines the scope of further work that is needed in this area. Stronger antitrust enforcement would also complement federal and state clean energy policies, ensuring that new technologies and business models can respond to policy signals.

**TO CREATE A THRIVING ECONOMY, THIS CHAPTER FOCUSES ON ACHIEVING THE FOLLOWING BENCHMARKS TO SUPPORT CHEAP, ABUNDANT, AND CLEAN AMERICAN ENERGY FOR ALL:**


- **BENCHMARK #5.1:** Families can afford their energy bills. | 129
- **BENCHMARK #5.2:** A modernized electric grid benefits consumers, workers, and communities. | 134
- **BENCHMARK #5.3:** Every American has access to affordable, reliable, and abundant clean energy because it's easy to build and deliver power. | 140
- **BENCHMARK #5.4:** Increased electricity demand supercharges U.S. clean energy manufacturing and deployment. | 149
- **BENCHMARK #5.5:** A renewed electric grid catalyzes business investments in the industries of the future, including electric and autonomous vehicles. | 156
- **BENCHMARK #5.6:** Communities are protected with a grid that is resilient to wildfire, extreme weather, and cyberthreats. | 159

CONGRESSIONAL LEAD:

POLICY EXPERT: FATIMA AHMAD

# Rep. Mike Levin

## CA–49



**I'M PLEASED TO PARTNER WITH SEEC INSTITUTE TO PRESENT OUR VISION FOR HOW TO ACHIEVE CHEAP, ABUNDANT, AND CLEAN AMERICAN ENERGY FOR ALL.** Right now, energy bills are skyrocketing across the country, and we need solutions that help American families and help our planet.

Before coming to Congress, I fought for climate action while working as an environmental attorney and in the clean technology sector by accelerating the transition toward more sustainable power generation and transportation alternatives. Through this work, I saw that we must have leaders in Washington working on policy to deliver a more sustainable future, so I decided to be the change I wanted to see. Now, as a member of Congress, I am constantly advocating to address climate change, build more clean energy, and protect our environment. This work has led me to serve as the Vice Chair of the Sustainable Energy and Environment Coalition (SEEC), Co-Chair of the SEEC Clean Energy Deployment Task Force, and now supporting this chapter of the Thriving Economy Project.

Addressing the climate crisis has always been and always will be core to my work. But right now, we are facing a new affordability crisis and working families across the country are struggling to afford basic necessities.

Politicians talk a lot about using our energy policy to make America strong, prosperous, and secure. But the real test of any energy policy is not what sounds good in a sound bite. It is whether working families feel relief when they open their utility statements. It is whether small businesses can forecast stable costs. It is whether seniors on fixed incomes are insulated from volatility rather than exposed to it. Families don't experience energy policy through slogans; they experience it through monthly statements. And right now, families are paying more to heat and cool their homes, more to keep the lights on, and more just to get through the month. For millions of Americans already stretched thin, this is yet another bill they can't afford. Our current approach to energy policy simply is not working.

The American people deserve better, for their wallets and for the air they breathe and the water they drink. We need to ensure that families have access to clean, affordable energy, which is why I am so pleased to be a part of the visionary work of the Thriving Economy Project and the conversations it is sparking.

The chapter ahead lays out how we can modernize our electric sector to ensure that families can afford their bills and we can energize the industries of the future. We are living through the most important global energy transition since the Industrial Revolution. The countries that deploy clean energy the fastest are lowering costs for their people, strengthening domestic manufacturing, and securing control over the energy supply chains that will define economic power for decades. I want America to lead in the industries of tomorrow so that my kids and their kids can enjoy a healthy, resilient, and thriving future.



BENCHMARK #5.1:

# Families can afford their energy bills.

**WORKING FAMILIES MUST BE AT THE CENTER OF ANY PLAN FOR A THRIVING ECONOMY AND THAT BEGINS BY ADDRESSING ENERGY AFFORDABILITY.** This section provides solutions for four key challenges:

1. Unaffordable bills and rising utility shutoffs
2. Outdated utility profit regulation
3. Natural gas price volatility
4. Energy waste



**Challenge – Unaffordable bills and rising utility shutoffs:** Energy bills are rising faster than households can manage as part of the country's larger affordability crisis. Nationwide, roughly 17% of Americans are struggling to keep up with their electric bills.[236] Households are worried about the lights being turned off and, in many cases, families are choosing between paying the electric bill and meeting other essential needs. **IN 2024, UTILITIES SHUT OFF ELECTRICITY 13.4 MILLION TIMES AND GAS 1.7 MILLION TIMES.**[237] These disconnections are most frequent in the South. Even as we work on longer-term measures for the electricity sector, millions of American families need near-term solutions.

## Policy Options:

- **ESTABLISH NATIONAL TIME OF USE RATES THAT GIVE HOUSEHOLDS TWO HOURS OF FREE ELECTRICITY A DAY.**
- Create an incentive navigator website to help households identify federal, state, and local incentives available to help them lower their energy bills.
- Provide technical assistance, incentives, and resources to support broader use of plug-in solar. Encourage new home design and construction for plug-in solar accessibility.
- Require data centers to pay into a new fund that will support the Low Income Home Energy Assistance Program (LIHEAP), the Weatherization Assistance Program (WAP), and Home Energy Rebates.
- Improve programs that provide direct support to families to lower their energy bills:
    - Ensure LIHEAP adequately addresses home cooling needs as climate-fueled heat waves stress communities across the country.
    - Ensure all state LIHEAP plans include special protections from disconnections for disabled consumers and during medical emergencies, and extreme weather. Ensure states prioritize arrearage management over disconnection.
    - Enable LIHEAP and WAP to work better together so that people receiving LIHEAP also qualify for WAP.
    - Expand the scope of weatherization assistance to include comprehensive upgrades, such as heat pumps, whole home retrofits, and pre-weatherization health and safety retrofits, and wrap-around services that enable efficiency upgrades.

## Policy Context:

Affordable and abundant renewable energy provides opportunities for immediate savings. Australia has leveraged its immense solar resources to provide its residents with up to three hours of free electricity when solar energy is plentiful, regardless of whether the residents live in homes or apartment buildings with solar panels.[238] This policy enables Australians to shift their electricity use to midday to immediately save money while also reducing system peaks that drive up costs for everyone.[239,240]

The United States is similarly blessed with abundant and affordable solar energy that is at its peak midday. Making electricity free during certain windows will reduce evening peaks, bills, and the need for expensive firm capacity and grid-scale storage. We may not be able to begin with three free hours because the U.S. power system is more heterogeneous. Two hours is an illustrative example and regulators can tune the duration or kilowatt-hour (kWh) limits to local conditions. A window of free electricity can still substantially cut peak-period demand and bills where renewables are abundant.

A complementary policy is to clear the pathway for plug-in solar. Many Americans live in apartment buildings where they cannot install rooftop solar. Germany allows residents to make use of plug-in balcony solar systems to maximize renewable energy deployment. Some U.S. states, including Colorado, Connecticut, Maine, Maryland, Utah, and Virginia have authorized residents to install plug-in systems that do not require an electrician for installation and do not require approval by the local utility. Federal technical assistance, incentives, and resources can help ensure that more Americans benefit from plug-in solar systems.

Given the extent of the affordability crisis, additional support will be needed to help families pay their energy bills in the near-term. Existing programs, including LIHEAP, WAP, and Home Energy Rebates, are doing important work, but the need is much greater than these initiatives can address. By creating a new fund that data centers pay into, the government can leverage the rapid development of data centers to expand the support provided by these programs and help struggling working families immediately. Benchmark #5.4 below contains additional recommendations on data centers.

Finally, stakeholders have recently proposed a federal rate relief fund for states that freeze or reduce residential electricity rates.[241] Benefits of this approach include providing immediate relief to ratepayers while tying funding for grid investments to important policy reforms, such as those that are described in this policy blueprint. This approach is an important example of how the federal funding proposals described in this policy blueprint can be tied to state-level policy reforms.

[236] Penn, I. & Elliott, R. (2026, January). *Three Hours of Free Power and Other Ideas to Lower Utility Bills.* New York Times. https://www.nytimes.com/2026/01/31/business/energy-environment/energy-bills-costs-states-trump-power-plants.html.

[237] Weil, J. (2026, April). *Americans' electricity was shut off 13 million times in a year, data shows.* Washington Post. https://www.washingtonpost.com/business/2026/04/26/utility-power-electricity-shutoff-bills/.

[238] Bowen, C. (2025, November). *More Australian homes to get access to solar power.* Commonwealth of Australia Department of Climate Change, Energy, the Environment and Water. https://minister.dcceew.gov.au/bowen/media-releases/more-australian-homes-get-access-solar-power.

[239] See, e.g., Commonwealth of Australia Department of Climate Change, Energy, the Environment and Water. (2026, March). *Options to Provide Solar Sharer Offer: Impact Analysis.* https://oia.pmc.gov.au/published-impact-analyses-and-reports/options-provide-solar-sharer-offer.

[240] Clean Energy Council. (2025, November). *Sun-powered savings: New scheme cuts bills and eases pressure on the grid.* https://cleanenergycouncil.org.au/news-resources/sun-powered-savings-new-scheme-cuts-bills-and-eases-pressure-on-the-grid.

[241] Higgins, T., Baker-Branstetter, S., Negron, M., Marquez, L., & Hughes, K. (2026, May). *A Plan for American Electricity Affordability*. Center for American Progress. https://www.americanprogress.org/press/release-caps-plan-to-make-electricity-more-affordable-and-reliable/.

**Challenge – Outdated utility profit regulation:** Utilities are important partners in building and sustaining a thriving economy. While utilities are regulated monopolies, rising residential energy bills are highlighting weaknesses in current regulations of utility profits. For context, in 2025–2026, average American residential electric rates rose 7.3% to reach 18.8 cents/kWh.[242] During the first half of 2026, electric and gas utilities asked state regulators for a cumulative $18.6 billion in rate increases.[243]

## Policy Options:

- Authorize the Federal Energy Regulatory Commission (FERC) to review whether current utility returns exceed the minimum requirements needed to incentivize proposed investments for the benefit of customers, including examining current use of low-cost financing mechanisms.
- To increase transparency, narrow the use of formula rates and strengthen prudence review by providing customers and state commissions broader discovery rights.
- End utility use of ratepayer funds for lobbying and advertising.
- Require executive compensation transparency, including:
  - Disclosure of the ratio of CEO-to-median-worker pay.
  - The share of compensation linked to earnings as opposed to customer outcomes like reliability, safety, resilience, interconnection timelines, and outage response.
  - The portion of executive pay recovered in regulated rates.
- Create a national floor for disallowances of excessive executive compensation and perks, such as the use of corporate jets and club dues, as non-recoverable in interstate transmission rates.
- Limit price gouging during extreme weather events by imposing price caps and public reporting requirements.

## Policy Context:

Utility regulation often encourages construction of new infrastructure, but it does not encourage minimizing operating expenditures. To address that, one approach is to change utility incentives (described below in Benchmark #5.2). A complementary strategy is to more closely evaluate utility business models to ensure they prioritize both reliability and affordability for ratepayers.

A first step is to more closely scrutinize equity investments by utilities when lower cost debt is available. Utilities often have a low risk profile and can take advantage of low-cost debt and federal financing programs.[244] Given these opportunities, utilities should primarily rely on debt to finance infrastructure investments. FERC has an important role to play in more closely evaluating utility profits.

Some states are already playing a leadership role on these issues. In April 2026, Pennsylvania Governor Josh Shapiro issued a letter to utilities recommending they avoid expensive equity investments when lower-cost debt options like U.S. Department of Energy (DOE) financing are available. He also asked them to better justify proposed rate increases, including explaining how much of a requested rate increase would go to a utility's investors. Finally, he asked them to provide "transparent, justifiable equity returns."[245]

Second, in most states, utilities may use ratepayer funds for lobbying, advertising, and trade association dues. Several states such as Colorado, Connecticut, Maine, and Maryland have prohibited utilities from using ratepayer funds for lobbying, advertising, and trade association dues. Careful use of ratepayer funds is essential, and these state models can be scaled nationwide.

Third, residential electricity bills have risen roughly 40% in recent years, while average CEO pay at investor-owned electric and gas utilities has increased about 47%, outpacing inflation and typical wage growth.[246] Maryland passed legislation capping how much of utility employee compensation, including executive pay, can be charged to ratepayers, requiring any excess to be funded from corporate profits or shareholders. Regulators in Colorado and some New England states, including Connecticut, New Hampshire, and Maine, have moved to disallow recovery of certain corporate costs from customers, including executive salaries and perks such as private jet use.

Finally, in times of extreme weather, grocery stores are prohibited from price gouging for essential items like water and milk, but we allow market pricing of electricity and natural gas during these same events. It is not clear that allowing surging prices provides any benefits to families paying their energy bills. While current energy law prevents market manipulation, price gouging during extreme weather does not qualify as market manipulation. Wholesale market prices can send important signals to market participants but retail consumers should not have this risk passed onto them.

[242] Howland, E. (2026, July). *Utilities requested $9.2B in rate hikes in Q2*. Utility Dive. https://www.utilitydive.com/news/utility-rate-hike-proposals-affordability-powerlines/825167/.

[243] PowerLines. (2026, July). *Utilities Request $18.6 Billion in Rate Increases in First Half of 2026.* https://powerlines.org/utilities-request-18-6-billion-in-rate-increases-in-first-half-of-2026/.

[244] Chapter 8: Accessible, Low-Cost Finance for a Clean Energy Future contains additional recommendations on leveraging federal financing programs available to utilities.

[245] Pennsylvania Governor Josh Shapiro (2026, April). *Letter to Utility Leaders.* https://www.latitudemedia.com/wp-content/uploads/2026/05/2026.4.29-JDS-Utility-CEOs-letter-v2.pdf.

[246] Kim, J. (2026, April). *Utility CEO pay surges amid higher profits, customer struggles.* Energy & Policy Institute. https://energyandpolicy.org/utility-ceo-pay-2025/.

**Challenge – Natural gas price volatility:** Working families are vulnerable to natural gas price spikes impacting their home heating and electricity bills. During times of volatility, oil and gas price increases can lead to record profits for producers. In 2024 and 2025, wholesale gas prices increased by 60% because demand exceeded supply and a larger share of U.S. natural gas production flowed to export markets instead of staying in domestic storage.[247] A producers-first energy policy and the conflicts in Iran and Ukraine have both made this problem worse. Moreover, natural gas price volatility should be considered in the context of rapidly increasing demand from data centers. Data centers are expected to build roughly 100 gigawatts (GW) of behind-the-meter natural gas power plants in the United States in the coming years.[248] Natural gas generation provides 43% of U.S. electricity and gas-fired generators set the price of electricity in most hours.[249] Therefore, such a large increase in natural gas use by behind-the-meter data centers will drive up the price for other gas customers, impacting both home heating and residential electricity bills.

## Policy Options:

- **CREATE A STRATEGIC ENERGY AFFORDABILITY RESERVE DRAWING FROM WINDFALL OIL AND GAS PROFITS TO GIVE STATES RESOURCES TO SECURE ENERGY PRICE STABILITY FOR THEIR RESIDENTS.**
- Create an Energy Price Safety Valve that will temporarily constrain exports of fuels that are in short supply.
- Ensure Liquefied Natural Gas (LNG) exports will not raise domestic energy prices or harm vulnerable communities when they are initially approved by the Secretary of Energy.
- Prevent market manipulation that increases energy bills by improving spot natural gas transparency, addressing information asymmetry between spot and futures markets, and strengthening oversight of gas and power traders.
- Reduce methane leaks, venting, and flaring from oil and gas development to capture the value of wasted gas. Require better monitoring, maintenance, and leak repair.
- For any behind-the-meter power plants, require data centers to use new, clean energy and energy storage to avoid driving up natural gas prices.

## Policy Context:

New policies are needed to address energy affordability emergencies. For example, windfall oil and gas profits can be taxed to create a Strategic Energy Affordability Reserve to mitigate financial harm to American households. The President can then declare an Energy Affordability Emergency that will trigger the release of Strategic Energy Affordability Reserve funds to states to help them support their residents. States can use the funds to assist residents with energy bills and transportation costs and to help residents obtain energy-efficient home appliances. An Energy Price Safety Valve should also be available to provide immediate price relief for Americans by temporarily constraining exports of LNG, refined gasoline, diesel, and home heating oil.

Current law requires the Secretary of Energy to approve exports of LNG that are consistent with the public interest, but the interests of energy producers and consumers often differ. To ensure energy affordability, the Secretary of Energy should first determine that exports will not likely materially increase energy prices or energy price volatility for U.S. consumers nor create a disproportionate health or environmental burden on rural, low-income, minority, and other vulnerable communities.

Energy affordability will also be enhanced by preventing market manipulation and increasing spot natural gas transparency. Current law requires annual reporting of natural gas transactions aggregated nationally. This should be changed to quarterly reporting by geographic spot markets. Transparency can also be improved by consolidating reporting of transactions of separately reported affiliates and by creating an electronic natural gas transaction information system. FERC and the Commodity Futures Trading Commission (CFTC) have a Memorandum of Understanding (MOU) to coordinate and share information on the intersection of spot and futures markets. However, FERC's jurisdiction over spot gas markets is limited to intervention in cases of market manipulation. Since price gouging is not considered market manipulation, statutory clarity on the ability of FERC to fully police spot gas markets is necessary. FERC and the CFTC should coordinate to address information asymmetry between spot and futures markets. There is a need to strengthen oversight and reporting of the interconnection of power and gas traders.

Another strategy to reduce energy bills is to eliminate methane waste from leaks, venting, and flaring because of the economic value of capturing the lost gas and because many of the innovative companies developing methane detection and leak mitigation systems are American. This economic case is stronger than ever in the context of globally constrained gas supply. Globally, nearly 200 billion cubic meters (bcm) of natural gas a year could be made available by reducing methane leaks, venting, and flaring, including nearly 15 bcm that would be available fast enough to bring down natural gas prices.[250]

On data centers, utility regulators do not have jurisdiction over contracts with gas suppliers for low-cost bulk natural gas to fuel behind-the-meter power plants so there are no guardrails in place to ensure energy affordability for communities. **REQUIRING DATA CENTERS TO USE NEW, CLEAN ENERGY AND ENERGY STORAGE FOR ANY BEHIND-THE-METER POWER PLANTS WILL AVOID DRIVING UP NATURAL GAS PRICES FOR OTHER CUSTOMERS.** Benchmark #5.4 below describes additional recommendations to protect communities from the impacts of data centers, including from their use of grid-connected electricity.

[247] United States Energy Information Administration. (2026, June). *Natural Gas: Henry Hub Natural Gas Spot Price*. https://www.eia.gov/dnav/ng/hist/rngwhhdA.htm.

[248] Feldman, E. (2026, March). *Data Centers Plan to Boost On-Site Gas Power 57-Fold, BNEF Says*. Bloomberg Law. https://news.bloomberglaw.com/health-law-and-business/data-centers-plan-to-boost-on-site-gas-power-57-fold-bnef-says.

[249] Rissman, J. & Gimon, E. (2026, June). *Behind-the-meter data center gas plants will raise U.S. energy bills.* Utility Diver. https://www.utilitydive.com/news/data-centers-raise-energy-bills-not-for-reason-you-think/822205/

[250] International Energy Agency. (2026, May). *Global Methane Tracker: Key Findings.* https://www.iea.org/reports/global-methane-tracker-2026/key-findings..



**Challenge – Energy waste:** Reducing energy waste across the economy is a common-sense strategy to put downward pressure on energy bills, including by reducing peak demand on the grid. Unfortunately, many households and small businesses do not have the resources to invest in energy efficiency upgrades to reduce their bills. New policy signals are needed to maximize available energy savings. Energy efficiency is also an economic opportunity because U.S. companies that manufacture energy-efficient appliances and equipment will be globally competitive. Weak efficiency standards, however, blunt the technological edge of U.S. industry.

## Policy Options:

- Establish a national energy efficiency resource standard to require electric utilities to achieve energy savings.
- Provide incentives based on the performance of upgrades like envelope improvements; heating, cooling, ventilation and water heating systems; and energy management systems. Provide incentives for the use of low temperature geothermal energy for building heating and cooling.
- Increase transparency in the energy costs of commercial and residential buildings, including through building energy benchmarking policies and by requiring disclosure of energy costs as part of sales and leases.
- Improve federally supported financing programs for buildings to account for the value of energy efficiency.
- Update energy efficiency standards for appliances and commercial equipment in tandem with a new tax credit for U.S. manufacturing of energy-efficient appliances and equipment.
- Provide funding for DOE to fund state energy auditors to help Americans lower costs and make homes more efficient.

## Policy Context:

Currently, 26 states and the District of Columbia have an energy efficiency resource standard but there is no equivalent federal policy to ensure a baseline level of efficiency across the country.[251] Both households and businesses will benefit if they can claim a performance-based tax incentive for energy efficiency upgrades, and the installation of these upgrades will generate local jobs in communities across the country. Leveraging federal financing programs to account for the value of energy efficiency will help address housing affordability and achieve energy savings. While there are existing energy efficiency standards under the *Energy Policy and Conservation Act* for household appliances and commercial equipment, many of them have been weakened or rolled back. Mandatory efficiency standards are one of the best ways of ensuring that everyone, including tenants in landlord-owned buildings, will have energy-efficient household appliances. Broader political support for these standards is possible if the updated energy efficiency standards can be complemented by a new tax credit for U.S. manufacturing of energy-efficient appliances and equipment. Policy that provides both a demand signal and supply side support is more likely to help U.S. industry increase its economic competitiveness globally.

[251] Mah, J., Nadel, S., & Subramanian, S. (2025, January). *Next-generation Energy Efficiency Resource Standards.* American Council for an Energy Efficient Economy. https://www.aceee.org/research-report/u2501.

BENCHMARK #5.2:

# A modernized electric grid benefits consumers, workers, and communities.

**GETTING MORE OUT OF THE EXISTING ELECTRIC GRID CAN HELP SPREAD FIXED COSTS OVER MORE VOLUME, PUTTING DOWNWARD PRESSURE ON BILLS.** This should be the first step as we build towards an expanded electric grid. This section provides policy options for five key challenges:

1. Lack of data transparency
2. Misaligned utility incentives
3. Slow uptake of grid-enhancing technologies and advanced conductors
4. An aging distribution grid
5. Slow uptake of AI for energy solutions



**Challenge – Lack of data transparency:** The lack of data transparency is a major roadblock to grid modernization in several ways. First, consumers, workers, and communities do not know how well the grid is utilized today. On average, utilization rates are at less than 50% compared to historical rates of nearly 70%, but this does not reflect specific conditions in communities across the country.[252] So long as that information is not publicly available, it is hard to build consensus to maximize the use of commercially available technologies that could make more out of the existing electric grid.

Second, it is hard for companies to bring new innovative solutions to the market when they do not have access to basic real-time information about energy usage on the distribution system. The lack of information prevents competition by blocking the full potential of using Distributed Energy Resources (DERs), vehicle-to-grid (V2G) technology, and energy efficiency technology. Consumers and businesses also often do not have access to their data from utilities which limits their ability to work with third parties on energy saving and peak demand reduction services.

## Policy Options:

- **ESTABLISH FEDERAL GRID CAPACITY UTILIZATION METRICS AND REQUIRE THE ENERGY INFORMATION ADMINISTRATION (EIA) TO COLLECT THIS INFORMATION FROM UTILITIES AND MAKE IT AVAILABLE TO THE PUBLIC.**
- Authorize DOE to collect data from utilities on transmission congestion and use the data to create and update transmission congestion maps that can help developers of innovative grid modernization solutions partner with utilities.
- Require utilities to disclose available headroom on the bulk electric system as well as electricity distribution system hosting capacity.
- Standardize grid operational datasets across utilities, encouraging 8760 (hourly) data disclosure for planning and interconnection, and requiring formats that allow planners, developers, and software tools to operate on shared, consistent information. Utilities should provide open access to real-time grid hosting capacity and smart inverter data to proactively manage demand spikes. DOE should establish national modeling and data standards to ensure consistent, transparent evaluation of large-load interconnections.
- Require consumer and business access to granular, real-time electricity and natural gas usage, hosting capacity, and pricing data and the ability to enable data sharing with third parties. DOE could establish utility data sharing guidelines and standards and require states to create their own rules based on the federal guidelines.

## Policy Context:

At a high level, it makes economic sense to maximize grid utilization even as we plan for an expanded electric grid because it is cheaper for everyone if the fixed costs of the grid can be spread out over more users. In fact, estimates suggest that increasing use of the existing electric grid could save more than $100 million over the next 10 years.[253]

Currently, EIA reports grid reliability and generation data but it can build on this foundation for the public interest. In April 2026, Virginia Governor Abigail Spanberger signed legislation directing electric utilities to propose grid utilization metrics for approval by the State Corporation Commission (SCC). Efforts to define the metrics are ongoing.[254] After the SCC approves the metrics, it will also approve a timeline for utilities to increase grid utilization. Virginia is the first state in the nation to take this approach. The following sections will describe the complementary policies that, with better data, could be deployed to make the most of the existing electric grid.



[252] Hledik, R., Lam, L. & Peters, K. (2026, March). *The Untapped Grid: How Better Utilization of the Power system Can Improve Energy Affordability.* Brattle Group. https://www.brattle.com/wp-content/uploads/2026/03/The-Untapped-Grid-Mar-2026.pdf.

[253] Hledik, R., Lam, L., & Peters, K. (2026, March). *New Brattle Report Finds Better Utilization of Existing Power Grid Could Save US Consumers More Than $100 Billion in the Next Decade.* Brattle Group. https://www.brattle.com/insights-events/news/new-brattle-report-finds-better-utilization-of-existing-power-grid-could-save-us-consumers-more-than-100-billion-in-the-next-decade/.

[254] Deploy Action. (2026, June). *What is the Future of Grid Utilization and Energy Affordability in Virginia?* https://www.deploy-action.org/newsroom/what-is-the-future-of-grid-utilization-and-energy-affordability-in-virginia.

**Challenge – Misaligned utility incentives:** Partnership with electric utilities is an important foundation for a thriving economy, and that requires understanding how current regulation shapes their business incentives. Innovative approaches can facilitate new solutions to longstanding challenges.

## Policy Options:

- Modernize the *Federal Power Act* to establish a shared savings incentive for the use of grid-enhancing technologies and advanced conductors.
- Create a standard, in accordance with *Public Utility Regulatory Policies Act* (PURPA) Section 111(d), to encourage states to establish performance-based ratemaking with clear, measurable metrics and goals to help increase electricity affordability and reliability, including through the use of DERs and Virtual Power Plants (VPPs).

## Policy Context:

Grid-enhancing technologies include dynamic line ratings, topology optimization software, and advanced power flow controls. Together with advanced conductors, this suite of technologies is sometimes referred to as advanced transmission technologies and they often show high benefit-cost ratios and quick payback for ratepayers. However, they do not meaningfully grow the utility's rate base so utilities have weak financial motivation to deploy them. Affordability is supposed to be part of the analysis of what is in the public interest under the *Federal Power Act*, but the reality is that there is a gap. Addressing utility incentives can help with many aspects of grid modernization.

At the federal level, a shared savings incentive for advanced transmission technologies can allow a developer to be reimbursed for the cost of the project, as well as some of the savings generated by it, while the remainder can be returned to ratepayers. At the state level, utility earnings can be decoupled from the volume of power sold to better align utility incentives with the public interest. Decoupling reduces the disincentive to support energy efficiency. Revenue decoupling is insufficient to achieve affordability by itself, however, so it is often considered as part of larger, more ambitious performance-based ratemaking frameworks.

Several states have established performance-based ratemaking, which ties utility returns to specific goals. Hawai'i has the most advanced framework. Colorado provides electric and gas utilities with incentives for achieving efficiency targets. New York established earnings adjustment mechanisms through its Reforming the Energy Vision initiative. A new PURPA Section 111(d) standard can encourage more states to adopt this approach to increase energy affordability, efficiency, and reliability. Shared savings incentives will also work well with DER and VPP programs, described in more detail below.

**Challenge – Slow uptake of grid-enhancing technologies and advanced conductors:** There have been many pilot projects of commercially available technologies to modernize the existing grid, ranging from grid-enhancing technologies to advanced conductors, but we have not seen deployment of these tools at scale. The previous sections addressed the lack of data transparency on transmission congestion and misaligned utility incentives. The following complementary policies can help accelerate deployment of advanced transmission technologies.

## Policy Options:

- **ESTABLISH A NATIONAL TRANSMISSION CONDUCTOR STANDARD.**
- Direct DOE to develop guidance, provide technical assistance, and create a clearinghouse of completed projects for utilities and developers seeking to implement grid-enhancing technologies.
- Ensure state energy conservation plans include a discussion of grid-enhancing technologies and advanced conductors.
- Direct federal Power Marketing Administrations (PMA) to enter into public-private partnerships to deploy grid-enhancing technologies and advanced conductors.
- Require Regional Transmission Organizations (RTOs) and Independent System Operators (ISOs) to conduct benefit-cost analysis in regional and interregional plans that considers both monetary and non-monetary benefits of deploying grid-enhancing technologies and advanced conductors. Non-monetary benefits include increased flexibility, increased resilience, reduced restoration time, and operational savings.

## Policy Context:

While state regulators can do a lot to support utility deployment of grid-enhancing technologies and advanced conductors, the federal government also has many tools at its disposal. Stakeholders have proposed a suite of solutions to help deploy more advanced transmission technologies in addition to the transparency improvements and modernized incentive structures described above. For example, prior attempts to simply encourage use of advanced conductors were hard to enforce; a national efficiency standard for transmission conductors will be simpler to administer.

DOE can also expand its efforts to help utilities manage the operational complexity and new data streams from advanced transmission technologies. It can also partner with state energy offices to ensure all states are taking advantage of advanced transmission technologies. DOE can encourage utilities to cooperate with each other by sharing feasibility studies rather than restarting a multi-year cycle to adopt new technologies.

The four PMAs (Bonneville, Western Area, Southwestern, and Southeastern) can have a major impact because they operate or use thousands of miles of high-voltage transmission serving large swaths of the country. Their lines are often key backbones for moving hydropower, wind, and other generation across regions, so performance improvements on PMA systems will have outsized regional benefits.

Finally, FERC oversees transmission planning at RTOs/ISOs and targeted improvements in benefit-cost analysis can help deploy more advanced transmission technologies. Benchmark #5.3 below provides additional recommendations to modernize transmission planning.

**Challenge – An aging distribution grid:** The electric grid was originally centrally planned as a one-way system, but a de-centrally optimized system using flexible grid management and smart distribution grid infrastructure is better suited to today's needs. Keeping the status quo is simply unsustainable in the context of rising demand for electricity. Given the important role of state public utility commissions in overseeing the modernization of the distribution grid, ensuring state capacity to meet the challenge is essential.

## Policy Options:

- Allow private sector, non-utility infrastructure developers to invest to help modernize electricity distribution system hardware and software. Where appropriate, third parties should be able to make these investments directly without the need for utilities to make a regulated return on upgrades they do not finance.
- Invest to modernize substations, including in standards-based, open, interoperable, and secure software-defined architecture for power system substations. Invest in energy storage as a distribution system asset. Support funding for deployment of advanced metering infrastructure. Shared savings incentives, described above in the context of advanced transmission technologies, can be a useful tool to help align utility incentives with these opportunities.
- Allow private sector, non-utility infrastructure developers to invest to pay for DERs and VPPs to bring new capacity online quickly. Allow these VPPs to be considered in large load interconnections along with new clean energy generation commitments and curtailment flexibility.
- Direct DOE, in consultation with the U.S. Environmental Protection Agency (EPA), state energy offices, code officials, and industry, to publish voluntary model permitting standards for routine residential EV, heat pump and heat pump water heater installations, including standardized applications, documentation checklists, and remote virtual inspection best practices.
- Direct DOE, in consultation with the National Institute of Standards and Technology (NIST), state energy offices, utilities, building officials, and industry stakeholders, to develop a model soft-cost reduction standard for routine residential energy upgrades. The standard should include instant or automated permitting for qualifying projects, standardized permit applications and documentation requirements, simplified or remote inspections, third-party inspection options, contractor training on automated processes, and clear interconnection timelines for eligible DERs. The standard should preserve manual review for complex or higher-risk projects while reducing unnecessary soft costs for routine installations.
- Direct DOE and NIST to develop model guidance for panel optimization, load management, circuit-sharing devices, and other safe alternatives to service upgrades for residential electrification.
- Require grid operators to study the potential capacity available from VPPs and DERs in their footprint to compare with current enrolled VPP capacity to identify latent potential and track this over time.
- Increase support for DOE to provide technical assistance to help state regulators quickly update regulations to support VPPs.
- Require and establish interoperability standards for equipment so all DERs can participate in VPPs.
- Direct DOE to issue grants to communities to obtain technical assistance to develop microgrids.
- Provide formula grants to states to ensure their energy regulators have the technical capacity and staff to oversee the modernization of the electric distribution system.

## Policy Context:

Modernizing the distribution grid can improve its reliability, enable greater efficiency and flexibility, and integrate higher levels of wind and solar energy which are among the cheapest forms of energy generation. Technology advancements in consumer devices, such as electric vehicles, residential batteries, heat pumps, and smart thermostats, are also raising public expectations about grid-integration. We can avoid utility capital costs and give ratepayers money back for their household budgets by leveraging demand response for DERs to help with broader affordability challenges. Benchmark #5.5 contains additional recommendations on Vehicle-to-Home (V2H) and V2G technologies.

To realize all these benefits, however, investments are required in distribution system hardware and software upgrades as well as in DERs such as residential solar and energy storage and electric vehicle charging infrastructure, that can be aggregated into VPPs. Allowing private sector non-utility infrastructure developers like technology companies to make these investments will bring a new source of capital to the table and will increase

competition.[255] Since VPPs can be deployed quickly with verifiable reductions to net peak demand, VPPs should be considered in large load interconnections along with new clean energy generation commitments and curtailment flexibility.[256]

Some states are leading on utilizing energy storage as grid assets for increased flexibility. In January 2026, Illinois Governor JB Pritzker signed the *Clean and Reliable Grid Affordability Act*. It established a target for utilities of 3,000 megawatts (MW) of storage by 2030. To qualify for state incentives, storage projects must be dispatchable grid assets. The law also established a VPP program for distributed resources, including dispatchable energy storage, to reduce peaks. Similarly, in April 2026, Virginia Governor Abigail Spanberger signed *House Bill 895/Senate Bill 448,* authorizing cost recovery of short-duration energy storage as electric grid distribution transformation projects. In addition to DERs and energy storage, microgrids also provide substantial resilience benefits for communities.[257]

There are supply chain challenges for many of the essential components and electrical equipment needed to modernize the electric grid. Benchmark #5.4 contains additional recommendations on easing supply chain bottlenecks to assist with grid modernization.

**Challenge – Slow uptake of AI for energy solutions:** Modernizing the grid includes upgrading both software and hardware. Advances in accelerated computing have opened the door to new AI tools to help electric utilities improve reliability, reduce costs, improve customer satisfaction, increase operational agility, and enhance sustainability. However, many AI pilot projects struggle to advance to broader utility-scale deployment. Challenges include the lack of industry-wide AI governance frameworks, the need for data quality and interoperability, integration complexity, change management headwinds, cybersecurity and privacy risks, intellectual property concerns, regulatory and compliance barriers, and the need for workforce adaptation.[258] Additional recommendations on AI tools for grid resilience to wildfire and extreme weather are described in Benchmark #5.6.

## Policy Options:

- Support electricity sector collaboration to outline responsible AI governance and develop guidelines for AI transparency and ethics for AI use in the electricity sector.
- Support standardization efforts for smart grid infrastructure and edge devices to improve interoperability.
- Create data sharing mechanisms with data standardization that includes metadata to help users find relevant information while protecting sensitive data. Using a distributed system with access controls could enable multiple agencies to access the data without requiring centralized storage.
- Create secure environments appropriate for the use of sensitive data from the electric grid to train AI models in collaboration with utilities.
- Invest in AI tools for cybersecurity to monitor threats and detect anomalies.
- Establish performance-based incentives and standards for the use of AI tools to achieve reliability and efficiency goals, including increasing utilization of existing grid assets.
- Establish a new formula grant program for states to provide funding to public power and rural electric cooperatives to use AI tools like their investor-owned utility peers.
- Support open-source AI platforms for the electric sector to lower costs, increase transparency and trust, and enable customization to local systems.
- Invest in utility workforce training so workers can leverage AI technologies to enhance their capabilities.
- Increase support for DOE to provide technical assistance to utilities on using AI across major use cases, including, as illustrative examples, helping them use AI tools for weather and load forecasting to better integrate affordable and abundant renewable energy and helping them aggregate and anonymize data from grid-edge computing so they can integrate AI and learn how to act upon the data.
- Encourage RTOs to use AI tools to streamline planning, interconnection, and dispatch using complementary models that reduce costs and improve efficiency.
- Convene a technical conference on optimizing interregional power flows by using the same software and scheduling approaches across regions. With this information, ensure the full, efficient, and cost-effective use of existing interregional connections.

[255] Quinlan, M. (2025, November). Virtual Power Plants Can Help Data Centers Connect to the Grid More Easily. Pew Charitable Trusts. https://www.pew.org/en/research-and-analysis/speeches-and-testimony/2025/11/21/virtual-power-plants-can-help-data-centers-connect-to-the-grid-more-easily.

[256] Chapter 6: Next-Generation Energy Technology Researched, Developed, and Built in America also includes additional recommendations on federal financing levers to support DER aggregation for VPPs.

[257] For additional recommendations on microgrids, see Chapter 3: Thriving, Affordable, Resilient Communities.

[258] The GridWise Alliance. (2026, March). *AI and the Grid: Unlocking the Potential of Artificial Intelligence for Electric Utilities*. https://gridwise.org/wp-content/uploads/2026/03/GridWise-Alliance-Publications_AI-and-the-Grid-Unlocking-the-Potential-of-Artificial-Intelligence-for-Electric-Utilities.pdf.



## Policy Context:

**ACCELERATED COMPUTING HAS A LOT TO OFFER THE ELECTRICITY SECTOR BECAUSE THE ELECTRIC GRID IS COMPLEX AND INVOLVES LARGE, DIVERSE DATASETS. OPERATIONAL OBJECTIVES ARE ALREADY DEFINED IN REGULATION AND ENGINEERING CODES, SO OPTIMIZATION USING AI TOOLS CAN DIRECTLY TRANSLATE TO INCREASED RELIABILITY, SAFETY, AFFORDABILITY, AND OTHER PUBLIC BENEFITS. PARTNERSHIPS BETWEEN UTILITIES AND TECHNOLOGY COMPANIES PROVIDE AN IMPORTANT OPPORTUNITY TO LEVERAGE ACCELERATED COMPUTING ADVANCES TO JOINTLY SOLVE ENERGY AND SUSTAINABILITY CHALLENGES. DOE HAS CONDUCTED SUBSTANTIAL RESEARCH OUTLINING THE SCALE OF THE OPPORTUNITY.**[259,260]

Public concerns about AI include the risks of bias, displacement, and concentration of power. **THE FEDERAL GOVERNMENT HAS AN IMPORTANT ROLE TO PLAY IN ADDRESSING THESE CONCERNS, HELPING GUIDE THE CREATION OF RESPONSIBLE AI FRAMEWORKS, FACILITATING STANDARDIZATION AND INTEROPERABILITY, SUPPORTING CYBERSECURITY STRATEGIES, AND PROVIDING INCENTIVES AND INVESTMENTS SO THAT ALL COMMUNITIES CAN BENEFIT FROM THESE NEW AI TOOLS, INCLUDING FOR ENERGY AND SUSTAINABILITY.** An essential component of this approach is a strategy for clean and efficient powering of AI that does not raise costs for ratepayers, which is discussed below in Benchmark #5.4.

[259] United States Department of Energy. (2024, April). *AI for Energy: Opportunities for a Modern Grid and Clean Energy Economy*. https://www.energy.gov/sites/default/files/2024-04/AI%20EO%20Report%20Section%205.2g%28i%29_043024.pdf.

[260] Daniel, C. et al. (2023). *Advanced Research Directions on AI For Energy: Report on Winter 2023 Workshops*. https://www.anl.gov/sites/www/files/2024-04/AI-for-Energy-Report_APRIL%202024.pdf.

**BENCHMARK #5.3:**

# Every American has access to affordable, reliable, and abundant clean energy because it's easy to build and deliver power.

**EVEN AS WE MODERNIZE THE GRID, WE MUST PREPARE TO EXPAND THE ELECTRIC GRID AND INCREASE CLEAN ENERGY GENERATION. ANALYSIS OF A JULY 2025 HEATWAVE DEMONSTRATED THAT CLEAN ENERGY SAVED THE ELECTRIC GRID OVER $114 MILLION OVER JUST THREE DAYS.**[261] Areas with significant solar, wind, and energy storage experienced lower electricity prices than other regions. When there is congestion on the existing grid and low-cost power cannot reach customers, however, the cumulative costs to customers are on the order of billions of dollars annually and reliability risks increase.[262,263] FERC and DOE both have important roles to play to address these challenges. The independence of FERC is a fundamental principle that underlies many of the recommendations outlined in this policy blueprint. This section provides policy options for seven key challenges:

1. Clogged interconnection queues
2. Outdated transmission planning
3. No shared understanding of transmission cost allocation
4. Transmission siting obstacles
5. Roadblocks to renewable development on public lands and waters
6. Lack of equitable access to clean energy
7. Permitting bottlenecks



[261] American Clean Power. (2026). *Clean Power Delivers During Heatwaves: July 2025.* https://cleanpower.org/resources/clean-power-delivers-during-heatwaves-july-2025/.

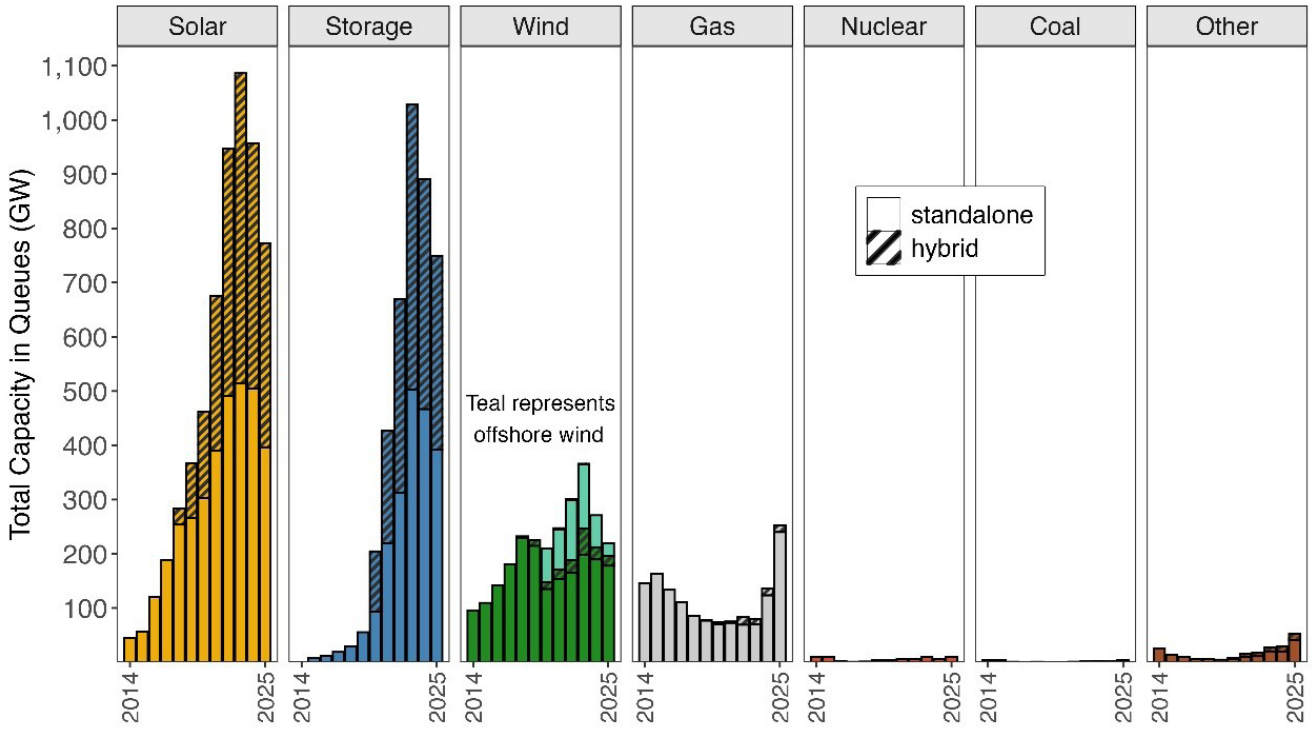
[262] See, e.g., Shreve, N., Selker, J., Zimmerman, Z., & Doying, R. (2025). *Transmission Congestion for 2024.* Grid Strategies. https://gridstrategiesllc.com/wp-content/uploads/GS_Transmission-Congestion-for-2024.pdf. (Finding U.S. grid congestion costs exceeding 10 billion dollars annually for four consecutive years and reaching more than 12 billion in 2024).

[263] Gordon, J. (2023, September). *Transmission Congestion: The Hidden Cost to Consumers.* Advanced Energy United. https://advancedenergyunited.org/blog/transmission_congestion_costs_2023. (Estimating U.S. congestion costs to consumers at 13 billion dollars in 2021 and 21 billion in 2022).

**Challenge – Clogged interconnection queues:** The United States has abundant and affordable renewable energy resources, but they cannot connect to the electric grid due to long backlogs in the interconnection queues. **AS OF THE END OF 2025, THERE ARE MORE THAN 8,000 PROJECTS WAITING TO CONNECT TO THE ELECTRIC GRID, INCLUDING 1,312 GW OF GENERATION AND ROUGHLY 749 GW OF STORAGE.**[264] The delays are due to the need to study the projects, identify the network upgrades needed to accommodate them, and then allocate the costs. Because the process is so lengthy, many projects choose to drop out. There is also concern that some of the projects in the queue are speculative placeholders, rather than real, ready-to-go projects.

## Policy Options:

- Develop streamlined resource-neutral energy-only interconnection processes (connect-and-manage [C&M]) that enable interconnection in six months or less.
- Ensure that RTOs/ISOs either use C&M or use a consolidated planning process that merges transmission planning with generator interconnection into one integrated planning process on a recurring basis. Pre-identify locations on the grid where there is already capacity or where new lines are planned.
- Strengthen pathways to allow generators to use surplus interconnection, which will enable new sources of electricity supply to connect to the grid at the site of an already existing supply resource using the interconnection service already allotted to that resource. Surplus interconnection can be same-owner augmentation or third-party co-location.
- Require the use of standardized study criteria to help expedite interconnection studies. Ensure that grid operators have all the data from utilities that they need to conduct the analyses quickly.
- Require regular public reporting of interconnection queue data, grid congestion trends, and energy infrastructure timelines to empower more efficient, strategic siting decisions, improving alignment between private investment and public infrastructure planning.
- Require RTOs/ISOs to improve coordination on affected system studies that occur when interconnection requests will affect more than one RTO/ISO.
- Require enforceable timelines for studies and penalties for speculative projects that do not advance.




Source: Rand, J., Cheyette, A., Talley, C., Zhang, S., Gorman, W., Wiser, R., Seel, J., Jeong, S., & Kahrl, F. (2026, December). *Queued Up: Characteristics of Power Plants Seeking Transmission Interconnection, 2026 Edition*. Lawrence Berkeley National Laboratory.

[264] Rand, J., Cheyette, A., Talley, C., Zhang, S., Gorman, W., Wiser, R., Seel, J., Jeong, S., & Kahrl, F. (2026, December). *Queued Up: Characteristics of Power Plants Seeking Transmission Interconnection, 2026 Edition*. Lawrence Berkeley National Laboratory. https://emp.lbl.gov/queues.

## Policy Context:

While nationally consistent technical standards for interconnection would be helpful, some of the most challenging interconnection issues are not about engineering, but instead about economics. Utility incentives do not always align with accelerating interconnection of new, lower cost generation. In July 2023, FERC issued *Order No. 2023* to improve generator interconnection by moving from a serial to a cluster study process, and by increasing financial deposit and site control requirements. RTOs/ISOs have been implementing the directives. Interconnection challenges are becoming more acute, however, because load growth is rising.

There are two approaches to generator interconnection queues that are working well. First, the Electric Reliability Council of Texas (ERCOT) uses a C&M approach to interconnection that prioritizes speed by allowing new generators to connect to the grid after only minimal studies of local upgrades, bypassing lengthy, proactive studies of the wider network. This approach allows developers to connect faster, managing grid bottlenecks post-connection via curtailment or re-dispatch rather than waiting for years of transmission upgrades.

Second, the Southwest Power Pool (SPP) uses a Consolidated Planning Process to integrate transmission planning and generator interconnection. SPP publishes available connection points in advance, and gives developers a clear, upfront interconnection price and a faster, one-cluster study process.

Generator interconnection can be improved if RTOs/ISOs select either C&M or a consolidated planning process to manage backlogs. Adopting one of these two strategies will also reduce the need for policies to address speculative projects and queue jumping because there will be less incentive to try to game the system.

There are also near-term strategies that will allow more low-cost generation to quickly connect to the grid. *FERC Order 845* required transmission providers to offer a Surplus Interconnection Service option that allows new generators to tap unused capacity at existing generator interconnections without going through a full new interconnection request. New guidance from FERC can help standardize and scale the use of surplus interconnection by expanding eligibility requirements and streamlining the process. Pathways for use of surplus interconnection capacity should also include standard requirements to allow exchange of capacity interconnection rights.

Additionally, new AI tools have been successfully deployed to help grid operators with automating intake and screening of applications for interconnection and should be used for studies as well.[265] As described above in Benchmark #5.2, one roadblock to leveraging accelerated computing solutions is that grid operators often do not have access to the real-time data they need to complete these studies. With the data in hand, grid operators should be able to commit to faster timelines. Near-term next steps for grid operators include conducting studies of all available tools and releasing public Requests for Proposals (RFPs) on additional automation solutions.[266]

**Challenge – Outdated transmission planning:** Unlike other countries, the United States does not have a single grid operator to conduct transmission planning, so keeping up with technological and economic changes is very difficult. Historically, U.S. utilities were isolated operations so utility engineers designed their own approaches for managing their infrastructure. Over time, utilities joined RTOs/ISOs to leverage market efficiencies, but these are voluntary constructs and they are not present in all regions of the country. It is true that each region has unique needs due to their geography and resources. **YET, AS A NATION, THE UNITED STATES RISKS FALLING BEHIND OTHER COUNTRIES THAT CAN PLAN AND BUILD ELECTRIC GRID INFRASTRUCTURE TO SUPPORT NEW INDUSTRIES FROM AI TO ADVANCED MANUFACTURING. IMPROVED TRANSMISSION PLANNING IS NEEDED IN THE UNITED STATES.**

## Policy Options:

- Interregional transmission must be sufficient to ensure reliability in the context of widespread extreme weather events so that the electric grid is "bigger than the weather." FERC should implement the recommendations of North American Electric Reliability Corporation's (NERC) 2024 Inter-Regional Transfer Capability Study.
- Require regional and regular interregional planning with a common set of assumptions and models. The plans should consider forecasted load growth over 20 years, the impact of large loads, and the use of grid-enhancing technologies, advanced conductors, and energy storage. The plans must evaluate multiple benefits of transmission, including reliability, grid resilience, congestion relief, avoided generation capacity, and energy cost savings. RTOs/ISOs should consider gas system constraints and contingencies in their planning assumptions.
- Ensure the benefits of smarter distribution grids, DERs, and VPPs flow into planning the infrastructure needed at the transmission system level.
- DOE should support standardized modeling and data formats for transmission planning and interconnection and promote the use of planning tools capable of evaluating energy system behavior across every hour of a typical year (temporal/8760 analysis).
- Require RTOs/ISOs to implement AI-enabled software that allows consolidation of planning, interconnection, and dispatch into complementary models that reduce costs and improve efficiency.

[265] Rosner, D. (2025). *Commissioner Rosner's Letters to ISOs/RTOs Regarding Interconnection Automation.* Federal Energy Regulatory Commission. https://www.ferc.gov/news-events/news/commissioner-rosners-letters-isosrtos-regarding-interconnection-automation.

[266] Krishnaswami, A. & Harper, C. (2026). *How Grid Operators Can Cut Energy Costs by Automating Interconnection Studies.* Evergreen Collaborative. https://www.evergreencollaborative.com/policy-hub/how-grid-operators-can-cut-energy-costs-by-automating-interconnection-studies/.

- Ensure that resource adequacy assessments are based on comprehensive, technology-neutral analyses that properly credit reliability contributions and account for all available next-generation technologies. Explicitly integrate transmission planning into capacity expansion modeling, recognizing transmission's contribution to resource adequacy.
- Support collaboration between DOE, FERC, the U.S. Department of Defense (DOD), and civilian stakeholders to expand interregional transfer capacity. Increase coordination between DOD and DOE to incorporate the loads of U.S. defense industrial base clusters in interregional transmission planning.
- Build a national transmission backbone to connect areas with abundant, low-cost renewable energy to population centers modeled after the Texas Competitive Renewable Energy Zones (CREZ) lines. Expand opportunities for private sector non-utility infrastructure developers to help with this effort.
- Require RTOs/ISOs to allow storage to be treated as a transmission asset and proactively consider storage in all planning and interconnection processes.
- Direct DOE to model multi-day weather events, renewable droughts, and winter peak loads to demonstrate the value of long duration energy storage (LDES) for transmission systems. Require RTOs/ISOs to run reliability scenarios that include winter peaks, renewable droughts, and constrained pipeline conditions in which LDES can be a least-cost option. FERC should develop cost metrics that highlight the system value, avoided costs, stability, reliability, and resilience that LDES provides. These cost metrics will complement the cost per megawatt-hour metric that is often used.
- Increase support for DOE to incorporate LDES into all grid and resource adequacy and electrification scenarios. Support planning tools that integrate LDES into transmission development to reduce congestion, avoid renewable curtailment, and defer new line construction.
- Direct DOE to provide technical assistance to RTOs/ISOs and Public Utility Commissions (PUCs) that seek to model increased LDES deployment for grid security and reliability.
- Increase support for DOE to help utilities improve load forecasting accuracy to avoid market distortions caused by speculative or duplicative data center projects. Establish national modeling and data standards to ensure consistent, transparent evaluation of large-load interconnections.

## Policy Context:

There are several challenges with transmission planning today. For example, transmission planning is often myopic, meaning it does not anticipate long-term trends such as increased demand for electricity, and it is geographically limited. In addition, proposed transmission projects are generally categorized as serving either economic efficiency, reliability, or public policy goals (an either/or approach) rather than being analyzed through a more holistic approach that considers all the potential benefits of a transmission project. Planning approaches vary by region without common assumptions or methodology across regions, and there is little interregional planning. Finally, the three major systems, the Eastern Interconnect, the Western Interconnect, and ERCOT, are connected by seams that need to be strengthened.

Due to outdated transmission planning, the transmission infrastructure built in the United States often consists of small, local grid fixes that are expensive and not closely scrutinized, instead of bigger transmission lines that can move more power and help the whole system. This drives up electric bills, slows down the connection of new power plants and clean energy projects, and makes the grid less reliable for households and businesses.

In addition to these long-standing systemic problems, technology moves faster than policy. Grid planning, including interconnection studies and load forecasting, needs to be updated to reflect the availability of flexible grid management strategies. As an example, dynamic line rating is not used in system planning or in interconnection processes even though it helps increase transmission capacity. Ideally, grid planning is updated to incorporate flexible grid management strategies in a standard way across states and regions for maximum efficiency and lower energy costs.

Data center load growth, discussed in more detail in Benchmark #5.4, provides additional challenges for transmission planning because it is common for data center developers to simultaneously negotiate with multiple utilities in different locations. As a result, transmission planners run the risk of not just double-counting, but potentially triple- or even quadruple-counting.

Most critically, NERC has underscored the vulnerability of the electric grid to extreme weather risks in its Interregional Transfer Capability Study that was directed by Congress in the *Fiscal Responsibility Act of 2023*.[267] Because these grid reliability risks are often regional, expanding interregional transfer capacity is a key strategy to ensure power reliability.

The federal government has taken steps to improve transmission planning. In May 2024, FERC issued *Order No. 1920* and it was revised to expand opportunities for state input. RTOs/ISOs are working on compliance filings. Codifying the essential reforms will improve certainty by reducing the risk of litigation and future policy rollbacks.

[267] Barsotti, D. et al. (2024, August). *Interregional Transfer Capability Study*. North American Electric Reliability Corporation. https://www.nerc.com/globalassets/initiatives/itcs/itcs_final_report.pdf.

## Challenge – No shared understanding of transmission cost allocation:

If the United States had a single grid operator, it would be able to make unilateral decisions about how to pay for new transmission infrastructure. In the absence of a national transmission planner, consensus is required among utilities. Disputes over cost allocation for new transmission bog down and prevent the buildout of new infrastructure. This process is opaque to outsiders, creating significant confusion. Aside from electricity sector experts, many people do not understand what the beneficiary pays principle means in terms of which transmission benefits are considered and who benefits from new transmission. Some of the pressure around paying for new transmission can be alleviated by better leveraging federal financing mechanisms for transmission infrastructure and by expanding opportunities for private sector non-utility infrastructure developers to help upgrade and expand the electric grid. Creative thinking will yield significant benefits because, like the interstate highway system, an expanded electric grid will enhance U.S. economic competitiveness.

## Policy Options:

- Increase funding for the Transmission Facilitation Program (TFP), through which DOE acts as a temporary, creditworthy customer to break the financing deadlock for multistate projects without assuming long-term construction risk. Allow more financial resources to be dedicated to a single project and offer flexibility so that applicants can increase the share of funding needed during the development phase of a project.
- Enable DOD to prioritize grid reliability and serve as an anchor tenant on High Voltage Direct Current (HVDC) lines that support military facilities. DOD could partner with utilities to deploy advanced transmission technologies around major DOD installations for resilience.
- Establish a 30% Investment Tax Credit (ITC) for new high voltage interregional and interstate lines, and for upgrades to existing lines using advanced transmission technologies and reconductoring that increases line capacity.
- Authorize FERC to explicitly regulate and competitively bid interregional planning. Direct grid operators to create a competitive process for interregional transmission, which allows additional transmission business models to compete to build interregional lines at lower costs for consumers.
- Establish procedures for a merchant transmission facility to recover from utilities the value of the reliability benefits it provides. Require a standard national process and pro forma agreement for merchant transmission to streamline grid entry. Convene a technical conference and develop market rules for capacity accreditation for merchant transmission.
- Expand opportunities for private sector non-utility infrastructure developers to build and pay for transmission.
- For nationally significant transmission lines, allocate costs according to a beneficiary pays principle and establish the benefits in legislation so it is clear which benefits are being considered.

## Policy Context:

In the context of increasing demand for electricity from large loads, there is increased scrutiny on how transmission is paid for and how to protect ratepayers. Under the *Federal Power Act*, FERC ensures that transmission rates are just and reasonable and not unduly discriminatory or preferential. A key principle for cost allocation is that beneficiaries of new transmission infrastructure should pay for its costs. Defining those benefits in legislation can help ensure alignment.

A key principle for cost allocation is that beneficiaries of new transmission infrastructure should pay for its costs. Defining those benefits in legislation can help ensure alignment.

**WHILE FERC REVIEWS WHOLESALE RATES, STATE REGULATORS DETERMINE HOW TO ALLOCATE COSTS ACROSS CUSTOMER CLASSES IN RETAIL RATES. AS DESCRIBED ABOVE IN BENCHMARK #5.1, MORE REGULATORY OVERSIGHT OF EQUITY INVESTMENTS BY UTILITIES CAN FACILITATE INCREASED USE OF LOWER-COST DEBT OPTIONS, INCLUDING FEDERAL FINANCING PROGRAMS LIKE TFP AND OTHER TOOLS PROVIDED BY THE DOE OFFICE OF ENERGY DOMINANCE FINANCING (EDF).[268] OPPORTUNITIES EXIST TO EXPAND THESE FEDERAL FINANCING PROGRAMS. FOR EXAMPLE, GIVEN THE CRITICAL ROLE OF ELECTRIC TRANSMISSION FOR NATIONAL SECURITY, DOD CAN PLAY A LARGER ROLE IN HELPING TO FINANCE NEW TRANSMISSION BY SERVING AS AN ANCHOR TENANT.[269] IN ADDITION TO FEDERAL FINANCING PROGRAMS, FEDERAL SUPPORT FOR TRANSMISSION INVESTMENTS THROUGH A NEW ITC CAN BE COMPLEMENTARY. ALL OF THESE OPTIONS LOWER THE TOTAL COST OF TRANSMISSION TO RATEPAYERS.**

Over the last year, there have been several creative proposals to create new federal entities, such as an American Grid Infrastructure Fund[270] or a National Transmission Authority,[271] to build and pay for new transmission. These are valuable suggestions for a longer-term horizon. In the very near-term, however, it is likely most helpful to focus on reforms that allow more competition within the existing system without creating new federal entities. Greater development of merchant transmission lines and transmission infrastructure built by private sector non-utility infrastructure developers create that competition.

[268] Chapter 8: Accessible, Low-Cost Finance for a Clean Energy Future contains additional details on federal financing programs that utilities can use.

[269] Chapter 7: A Nationally Secure, Globally Competitive Energy Sector contains additional recommendations on energy security.

[270] Flegal, J. (2026, March). *Seizing the Data Center Buildout for Grid Modernization*. Searchlight Institute. https://www.searchlightinstitute.org/research/seizing-the-data-center-buildout-for-grid-modernization/.

[271] Wolf, D. (2026, April). *Why We Need a National Transmission Authority.* Clean Economy Project. https://cleanecon.org/how-to-build-a-grid-for-the-future/.

States are also exploring how to pay for new transmission. In fall 2025, California enacted *Assembly Bill 825* creating the new Public Transmission Financing Fund within the California State Treasury to be administered by the California Infrastructure and Economic Development Bank (I-Bank). The I-Bank can provide loans directly to public transmission sponsors or through a lending institution. The I-Bank can also issue taxable or tax-exempt bonds and lend the proceeds to transmission sponsors.[272]

**Challenge – Transmission siting obstacles:** Interstate electric transmission infrastructure is economically beneficial to the geographical areas where electricity is generated and to the population centers where it is used. It is also beneficial for all Americans because it increases U.S. economic competitiveness, much like the federal interstate highway system. Without a better integrated national macrogrid, the United States will not be able to compete with other nations that have a single national grid because those nations can better source enough power to win the industries of the future from AI to advanced manufacturing. Under the current U.S. legal regime, however, there are opportunities for opponents of new transmission infrastructure to use state law to block development.

## Policy Options:

- Provide incentives to states that participate in the DOE Coordinated Interagency Authorizations and Permits (CITAP) process so that project developers can effectively access a one-stop shop for permitting.
- Provide technical and financial assistance to help states create and operate state transmission authorities that can finance and build transmission infrastructure. These new state agencies should have bonding authority, status as an independent agency, and eminent domain authority. They should consult with applicable RTOs/ISOs and can be further incentivized to consider lines of regional and national importance within their state.
- Direct the U.S. Department of Transportation (DOT) to provide technical and financial assistance to states to utilize existing rail and highway rights-of-way for co-location of electric transmission and other utility infrastructure. Expand eligibility under the Federal-aid Highway program to cover projects to build transmission and broadband infrastructure within existing federal highway rights-of-way.
- Create a Community Economic Development Transmission Fund to support communities that host transmission lines and to promote conservation and recreation. Fund it with a portion of the interest on federal loans for transmission.
- Update the *Federal Power Act* provisions on federal siting of interstate transmission lines so that if FERC determines that a transmission line is in the national interest, it can issue a construction permit without DOE having to designate a national transmission corridor first. FERC will need to allow for a public comment period and for state consultation. Transmission lines in the national interest include lines that are 750 MW or 345 kilovolt (kV) or greater, and extend over at least two states, or one state and the Outer Continental Shelf, or 150 miles.
- As part of giving FERC more siting authority over interstate transmission lines, create and require a version of the DOE CITAP process.

## Policy Context:

In the 1930s, Congress gave the federal government primary siting authority for interstate natural gas pipelines. In contrast, due to the decentralized way the U.S. electric grid was built, the federal government never received primary siting authority for interstate transmission lines. While the *Energy Policy Act of 2005* created federal backstop siting authority, and the *Infrastructure Investment and Jobs Act* (IIJA) in 2021 improved it, no new transmission infrastructure has been built using the authority. As a result, it is very difficult to site new interstate transmission infrastructure because large transmission projects span hundreds of miles and multiple jurisdictions, allowing even a few organized, opposed communities to significantly slow progress.

**IN THE VERY NEAR-TERM, PROVIDING INCENTIVES FOR STATES TO USE THE DOE CITAP PROCESS WILL HELP CREATE A ONE-STOP SHOP FOR TRANSMISSION INFRASTRUCTURE PERMITTING.** More broadly, treating communities as partners can be a catalyst for faster, more equitable transmission build-out. State transmission authorities, such as the New Mexico Renewable Energy Transmission Authority (NM RETA), can be helpful in developing infrastructure that has the support of local communities because they can help coordinate planning, financing, and siting in ways that reflect local priorities and reduce risk for communities. Federal support for state transmission authorities can build a foundation for greater cross-state collaboration on transmission lines of national and regional importance.

Communities also benefit when new transmission is sited alongside existing transportation rights-of-way because this approach reduces local land impacts, speeds projects that deliver cleaner and more reliable power, and creates opportunities to bundle additional public interest infrastructure in corridors that are already working landscapes.[273]

Ultimately, there needs to be a way to engage communities as partners by ensuring they benefit economically from the development of transmission infrastructure. A Community Economic Development Transmission Fund can help ensure equitable development of energy infrastructure.

[272] See Chapter 8: Accessible, Low-Cost Finance for a Clean Energy Future for additional policy recommendations on federal finance for electric transmission infrastructure.

[273] NextGen Highways. (2022, November). *The Societal Value of Co-Locating Electric Transmission Infrastructure in Highway Rights-of-Way*. https://nextgenhighways.org/wp-content/uploads/2023/01/NGH_Societal-Value-Co-Locating-Transmission-Highways.pdf.

**Challenge – Roadblocks to renewable development on public lands and waters:** The United States is blessed with abundant and affordable renewable energy resources, and there is more the federal government could do to better manage public lands and waters for clean energy development that benefits communities. Policy certainty is essential, including respecting authorizations issued for already approved energy infrastructure. The following complementary policies will also help make the most of our natural resources while balancing development with other uses of our public lands and waters.

## Policy Options:

- Establish standardized, streamlined permitting procedures for geothermal energy and ensure offices have sufficient expertise and attention on enhanced geothermal systems. Increase the frequency and certainty of leasing public land for geothermal energy.
- Co-locate renewable energy on oil and gas leases, as appropriate.
- Direct the U.S. Department of the Interior (DOI) to conduct programmatic planning for affordable and abundant renewable energy development on public land, building on the success of prior efforts for wind and solar energy.
- Provide state and local governments a share of the revenue to promote responsible development of renewable energy on public lands and waters. Facilitate federal revenue sharing for offshore wind projects.
- Allow for a portion of renewable energy revenues to fund timely permit processing for renewable projects.
- **DECOUPLE ONSHORE AND OFFSHORE RENEWABLE ENERGY LEASING FROM OIL AND GAS LEASING. RENEWABLE ENERGY GROWTH SHOULD BE TIED TO TRANSMISSION PLANNING AND ELECTRICITY DEMAND, INSTEAD OF AN ARBITRARY OIL AND GAS LEASING SCHEDULE.**

## Policy Context:

Public lands and waters are managed for multiple uses. Effective management ensures that Americans benefit from the available renewable energy resources while protecting and conserving public lands and waters for future generations. There are practical steps that can be taken today.

The Desert Renewable Energy Conservation Plan (DRECP), a joint initiative of the California Energy Commission, the U.S. Bureau of Land Management (BLM), the California Department of Fish and Wildlife, and the U.S. Fish and Wildlife Service (FWS), is an example of a landscape-scale plan with development focus areas and conservation lands that balances utility-scale solar, wind, and transmission with desert conservation.

Building on the DRECP, elements of land and water management that promote renewable energy development include landscape-scale planning to designate priority development zones and off-limits conservation areas to reduce conflict and speed review, lower fees for projects in priority zones as well as revenue sharing to increase local support, standardized mitigation tools, and interagency coordination and corridor planning.

Successful development of renewable energy on public lands requires policy certainty and public-private partnerships. In 2022, the Foundation for America's Public Lands was launched as the official Congressionally chartered nonprofit partner of BLM, reflecting the growing importance of public lands and waters. The Foundation itself does not write permitting rules or directly remove regulatory roadblocks, but it is explicitly designed to support BLM's multi-use mission which includes renewable energy development. The Foundation supports community engagement and planning capacity, both of which can help smooth the path for responsible renewable energy on public lands and waters. Agencies must act in good faith in order to make the most of these opportunities to partner with the private sector.



**Challenge – Lack of equitable access to clean energy:** The United States is blessed with affordable and abundant renewable energy, but there is uneven clean energy development across the country: some communities have access to it, while others do not. We should not repeat historic patterns of environmental injustice. There is more the federal government can do to help all communities have access to clean energy, including frontline, low-income communities, and communities of color.

## Policy Options:

- Restore awards that have been legally obligated through programs such as the Greenhouse Gas Reduction Fund, including Solar for All, the Environmental and Climate Justice Block Grants, the Community Change Grants, and the Neighborhood Access and Equity (NAE) Grants. Reauthorize these programs to ensure they reach communities in need.
- Provide technical and financial assistance to support siting, constructing, permitting, and operating clean energy and energy storage on brownfields and other previously disturbed land.
- Provide incentives to develop residential and community-scale renewable energy in historically disadvantaged communities.
- Authorize federal agencies to enter into 30-year contracts for electricity, allow agencies to pay for the electricity using annually appropriated funds, and direct agencies to serve as anchor tenants for clean power projects that benefit surrounding communities.
- Direct DOE to provide technical assistance for clean energy development in defense communities near DOD facilities.
- Expand clean energy development in U.S. territories.
- Ensure that Community Choice Aggregators (CCA) are eligible for federal grant funds.
- Provide incentives to encourage states to authorize CCAs. Increase support for DOE to help communities assess, form, and operate CCAs, particularly in areas where technical, legal, or financial expertise may be limited.
- Conduct a national study on the benefits of community-led energy procurement and development, including through CCAs, and identify the coordination needed to scale this model nationwide.

## Policy Context:

Environmental injustice systematically increases the cost of basic needs such as housing, health, energy, and transportation for low-income communities, while wealthier communities reap environmental benefits at lower risk and cost. Integrated policy solutions, such as affordable and energy-efficient housing, equitable transit-oriented development, and targeted resilience investments, can reduce both household costs and environmental burdens.

**IN THIS CONTEXT, SPEEDING UP CLEAN ENERGY DEPLOYMENT CAN MAKE ENERGY SYSTEMS MORE AFFORDABLE OVERALL, BUT POLICY IS NEEDED TO ENSURE THAT ALL COMMUNITIES CAN ACCESS THE TECHNOLOGIES AND PROGRAMS THAT GENERATE SAVINGS**[274] Targeted retrofit programs, inclusive financing, and community solar can help make clean energy more accessible and affordable for everyone.

**Challenge – Permitting bottlenecks: AMERICA'S FOUNDATIONAL ENVIRONMENTAL LAWS HAVE FACILITATED CLEAN AIR, CLEAN WATER, AND THRIVING ECOSYSTEMS, AND THEY SHOULD BE DEFENDED TO ENSURE THE SAME PROTECTIONS ARE AVAILABLE FOR FUTURE GENERATIONS. AT THE SAME TIME, FEDERAL AGENCIES ARE STRUGGLING TO KEEP UP WITH THE WORK INVOLVED IN IMPLEMENTING THESE LAWS.** For developers of clean energy and grid infrastructure, the permitting process can be uncertain, and it often takes too long. While there are opportunities for streamlining, we must also ensure that communities continue to be at the table during environmental review and siting of energy infrastructure. Partnering with state, local, and Tribal governments is a key solution to this challenge. A complementary way to tackle these challenges is to leverage advances in technology to alleviate workload concerns while strengthening environmental analysis.

## Policy Options:

- Create a competitive challenge grant program that rewards state and local governments for adopting and implementing robust minimum local siting standards, tying awards to policy design and measurable deployment outcomes.
- Increase funding for the DOE Reliable Energy Siting through Technical Engagement and Planning (R-STEP) program to provide technical assistance to state, local, and Tribal, governments on siting large-scale renewable energy.

[274] Chapter 2: Growing Rural and Tribal Economies, Chapter 3: Thriving, Affordable, Resilient Communities, and Chapter 7: A Nationally Secure, Globally Competitive Energy Sector contain additional recommendations relevant to community-specific concerns, including defense communities.

- Ensure state, local, and Tribal governments, including Tribal (THPOs) and state historic preservation offices (SHPOs), have the resources they need to gather community input to inform project development.
- Restore and increase federal agency staff capacity for permitting, including at EPA, DOI, and the National Oceanic and Atmospheric Administration (NOAA).
- Establish a university permitting workforce leadership program to provide grants for career training to help expand the pool of qualified staff for federal, state, and local governments.
- Launch a dedicated federal effort to ensure the 300+ existing technology tools for permitting can work together and support agency staff effectiveness. Building on this foundation, require standardized data formats, automated project screening tools, and a unified interagency authorization portal. Use AI and digital technologies to help alleviate agency staff workload and improve the quality of environmental review.
- Provide technical and financial assistance for states to develop data standards that facilitate data sharing across states and with federal agencies.
- Ensure robust public participation in infrastructure decisions while giving clear guidance to applicants and adhering to predictable deadlines.
- Provide incentives to work with communities and historically disadvantaged groups early in the permitting process to reduce risk, avoid conflict, and share the benefits from America's abundant and affordable renewable energy resources.
- Establish dedicated Community Engagement Officers at federal agencies to work with communities to address problems and share benefits. Fund states to stand up a community advocate office to ensure communities play a collaborative role in infrastructure development.
- Establish a predictable timeline for Class VI well permitting for carbon sequestration. Create a federal siting authority for interstate $CO_2$ pipelines. Allow processes for federal permitting of transmission upgrades and co-located storage projects to be reviewed under a single coordinated process to avoid duplicative environmental reviews.

## Policy Context:

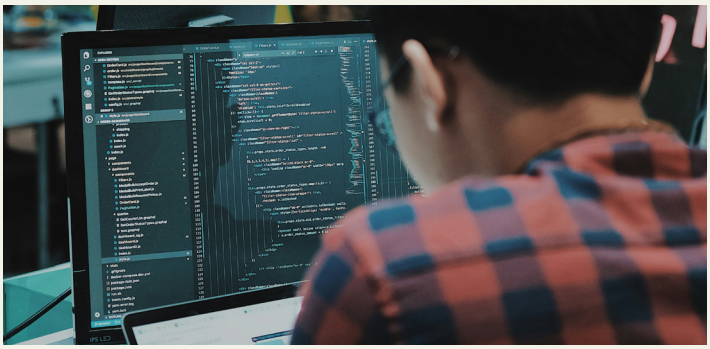
Targeting the main drivers of permitting bottlenecks, including disparate processes, capacity constraints, weak data infrastructure, and community conflict, can help facilitate faster and more predictable environmental reviews while maintaining public trust.

The federal government has had success with race-to-the-top competitions in education and transportation. The challenge grant model can be used to address siting reform by encouraging state and local governments to modernize their permitting processes. State and local governments might receive smaller planning grants if they commit to passing qualifying legislation by a deadline, followed by larger implementation grants on a competitive basis. An alternative approach is to create a formula program conditioned upon adoption of updated siting standards with pass-through funding available to local governments for permitting improvements.

The federal government can also increase its support of state, local, and Tribal capacity by providing additional technical and financial assistance. R-STEP supports state-based collaboratives to improve large-scale renewable energy siting, planning, and permitting. Scaling R-STEP will increase the number of states that have access to expert support on environmental impacts, zoning ordinances, community engagement, and fire safety codes. A major ongoing need is for additional support for THPOs and SHPOs to ensure that concerns about cultural, historic, and environmental resources are identified early. The federal government also needs to restore and increase staff capacity for environmental review and permitting. Ensuring a pipeline of future leaders by partnering with universities is an important component.

New technology tools demonstrate the potential to alleviate staff constraints. **THE DOE PACIFIC NORTHWEST NATIONAL LABORATORY (PNNL) IS LEADING THE PERMIT AI INITIATIVE TO REDUCE THE TIME AND COST OF ENVIRONMENTAL REVIEWS UNDER THE *NATIONAL ENVIRONMENTAL POLICY ACT* (NEPA). THE INITIATIVE RELEASED NEPATEC 2.0, AN OPEN-ACCESS, MACHINE-READABLE DATASET CONTAINING OVER 120,000 ENVIRONMENTAL DOCUMENTS FROM OVER 60 AGENCIES.** Using the tools, federal staff can easily search for relevant environmental analyses across decades of past documents. yet, the lack of interoperability between technology systems at agencies is a challenge: many systems are siloed, duplicative, and incompatible.[275] They also do not help staff determine which issues apply to a project and how. Staff use their own expertise to piece information together, which takes time. A dedicated federal effort to ensure these technology tools work together will be an important step forward.

Finally, the best way to ensure project success is to co-ideate with communities. **INCENTIVES FOR EARLY, SUBSTANTIVE ENGAGEMENT WITH HISTORICALLY DISADVANTAGED COMMUNITIES WILL ENCOURAGE DEVELOPERS TO CO-DESIGN PROJECTS AND BENEFIT-SHARING ARRANGEMENTS, LOWERING THE LIKELIHOOD OF OPPOSITION GROUNDED IN PAST HARMS OR LACK OF AWARENESS OF SITE CONFLICTS.** Dedicated community engagement roles at federal agencies will create institutional points of contact that help communities navigate complex permitting processes and escalate concerns before they become crises.[276]



[275] Sheridan, B. (2026, March). *We Have a Tool for Everything, But a System for Nothing.* Environmental Policy Innovation Center. https://www.policyinnovation.org/insights/we-have-a-tool-for-everything-but-a-system-for-nothing.

[276] Chapter 9: A Government that Delivers contains additional recommendations on improving environmental review of energy infrastructure.

BENCHMARK #5.4:

# Increased electricity demand supercharges U.S. clean energy manufacturing and deployment.

**A CLEAN, UPGRADED, AND EXPANDED ELECTRIC GRID IS THE LINCHPIN OF ECONOMY-WIDE DECARBONIZATION BECAUSE IT WILL SUPPORT CARBON-FREE VEHICLES, BUILDINGS, AND INDUSTRY.** While AI is driving the conversation around the electric sector now, this is not solely an AI problem to be solved. Demand from AI can help us pull forward commercialization of 24/7 clean power and accelerate the timeline we were already on. At the same time, the prior policies we contemplated to solve the climate crisis are not enough. We need new and complementary policies for AI data centers because data center demand for electricity is so large as to be different in kind, not just in degree, from what we have seen before. This section provides solutions for three key challenges:

1. Data center power needs
2. Outdated wholesale power markets
3. Supply chain weaknesses



**Challenge – Data center power needs:** There are several issues related to data center power needs. First, due to the competitive nature of the technology industry, there is a lack of transparency on data center energy and water use. We know data center energy use is rising dramatically as racks become more power dense. To date, the federal government has asked little of the technology sector in terms of reporting. Moreover, there is insufficient transparency on future energy use. As data center developers simultaneously negotiate with multiple utilities in multiple geographic locations, transmission planners run the risk of overbuilding if some of the data centers do not materialize.

Second, as demand for power increases, many states are taking novel approaches to protect their residents from the costs of grid upgrades and new energy generation for data centers. In June 2026, FERC took a first step towards ensuring RTOs/ISOs have some measures to protect ratepayers from the risk of speculative large loads. The proceedings are ongoing, but more federal action will likely be needed. The bottom line is that there is no federal floor in terms of what states must do to protect ratepayers. Ultimately, states are where utility rates are set, but the federal government's role is complementary. Also, as described earlier in Benchmark #5.1, data center use of behind-the-meter natural gas plants is outside the jurisdiction of utility regulators and will drive up energy prices if left unaddressed.

Third, grid reliability is an issue because, unlike other large users of electricity, computational loads at data centers can quickly ramp power up and down during AI training in a way that can cause cascading impacts and damage grid equipment. FERC will require impact studies of large loads prior to interconnection to the transmission systems in RTOs/ISOs. NERC is also working on developing standards for large loads, which may fill some of the gaps.

Fourth, the United States must have a sustainable power strategy for AI to leverage the opportunities that accelerated computing provides for energy, the environment, and economic competitiveness. Some technology companies have admirable clean energy goals and are doing their part to commercialize critical technologies like LDES, next-generation geothermal energy, and nuclear energy through procurement commitments and investments. The federal government could be a better partner by helping advance new 24/7 clean energy development and building a much more robust grid that can ensure the benefits of adding more energy generation are shared with all Americans.

As we work on building more 24/7 clean energy, we can help data center developers with speed to power, and we can help utilities avoid near-term capital costs by using flexible interconnection of data centers. Rather than assuming data centers will use grid power for all 8,760 hours of the year, a flexible interconnection approach would ask data centers to use less grid power during peak times. During those peak times, data centers could switch to backup generation, including new clean energy, energy storage, or VPPs. FERC will require RTOs/ISOs to make available non-firm transmission services and faster generator interconnection processes that will encourage and enable load flexibility. However, implementation details will likely vary, so close attention by policymakers will be needed.

Finally, new areas for additional policy work include strategies to reuse heat from data centers as part of thermal networks and approaches to minimize local water impacts.

## Policy Options:

**ENERGY USE TRANSPARENCY**

- Require data centers to disclose their energy and water use.
- Mandate DOE to collect and publish data on proposed data centers, any associated on-site generators, the interconnected utility, the project's development status, and cooling technology to be used, among other data.
- Direct DOE to develop new metrics for data center and AI energy efficiency that looks at the efficiency of hardware, software, and the integration of hardware and software.
- Direct DOE and EPA to implement an Energy Star-equivalent program for AI tools.
- Direct the joint Federal-State Task Force on Electric Transmission to develop consensus on mandatory reporting and disclosure requirements for data center developers negotiating with multiple utilities in multiple locations to avoid overbuilding for speculative projects. DOE should issue recommendations and guidance to encourage states and regulators to consider MW-based study fee deposits for high-capacity load requests to reduce the number of speculative projects. DOE should also recommend potential milestone requirements for utilities to consider before including new large loads in planning studies.

### PROTECTING RATEPAYERS

- Establish a federal floor for ratepayer protection from the costs of serving new large loads. Elements of the federal floor could include:
  - A requirement for utilities to recognize flexible large loads.
  - Large load tariffs as a separate rate class.
  - Contractual minimums and/or take-or-pay obligations.
  - Extended contract terms after the initial period.
  - Cost recovery agreements and/or financial deposits and guarantees, including from parent companies.
  - Early termination and exit fees.
  - Direct assignment of the costs for dedicated generation facilities.
  - Direct assignment of the costs for transmission or distribution infrastructure or Contribution in Aid of Construction (CIAC) for transmission and substation infrastructure.
  - Flexible service requirements and load ramp schedules.
  - Capacity release provisions for natural gas pipeline or storage capacity.
  - Minimum requirements for community engagement and Community Benefit Agreements (CBA).

### GRID RELIABILITY

- Develop mandatory reliability standards for data centers to protect other electricity users from fluctuations in power quality and blackouts. As part of the standards, require:
  - Disclosure of load ramping schedules.
  - Ride-through requirements of large loads analogous to inverter-based resource standards to avoid mass tripping during disturbances.
  - Frequency support and controllable ramping.
  - Installation of fault recording devices to assess data center performance during grid disturbances to help grid operators regularly analyze the grid stability margin.
- Increase support for DOE to help transmission planners better model data center electricity use in planning studies.
- Require large loads to install equipment or technology that allows those loads to be curtailed remotely during firm load-shed events, as a condition of interconnection.

### SUSTAINABLE POWER STRATEGIES FOR AI

- Create a U.S. Electron Accelerator to support deployment of abundant renewables, storage, and LDES alongside clean, firm generation, such as next-generation geothermal energy and nuclear energy, paired with demand flexibility, improved grid utilization, and VPPs. Under this fee-and-rebate (feebate) initiative, data centers will pay into the Electron Accelerator for electricity usage not matched to new, clean energy generated at the same time and in the same location. The collected funds will be used in an auction format to help data centers cover the premium for clean electricity contracts that generate power to better match around-the-clock data center energy demand.
- Ensure data centers in all 50 states can directly procure clean power through a clean transition tariff or direct wholesale market access.
- Create a platform to help match companies seeking to build data centers with clean energy and energy storage projects seeking interconnection and offtake.
- Develop a success fee, based on megawatts added, for utilities that deliver new interconnection pathways that measurably increase system utilization and reduce costs for all consumers.
- To the extent there are data center projects with a federal nexus either because they are on federal lands or because they received federal funds, direct DOE and the U.S. Department of Commerce to consider prioritizing a latency-first approach through which they will look for unused capacity on the existing grid to facilitate interconnection.
- Direct DOE to leverage existing funding programs such as TFP and the Speed to Power through Accelerated Reconductoring and other Key Advanced Transmission Technology Upgrades (SPARK) to support deployment of grid-optimization tools that identify and activate unused hosting capacity.
- Faster interconnection should be available for large loads that agree to flexible/interruptible service and bring their own capacity, which can be a combination of new clean energy generation, storage, and VPP participation. Flexible large loads and co-located clean energy generation (clean energy parks) will help avoid data center contributions to annual peaks and bring new clean energy online.
- To protect communities from the health impacts of harmful pollution from backup generation for data centers:
  - Clarify and strengthen classification of generators as stationary sources.
  - Tighten emergency and testing allowances.
  - Require cumulative impact analysis in clustered areas.
  - Ensure agencies have adequate resources for permit enforcement.
  - Condition emergency waivers on pollution safeguards.
  - Integrate EPA into 202(c) order design.
  - Phase down diesel reliance.
  - Require monitoring near large clusters.
  - Require public reporting of generator operations.
  - Strengthen community engagement.
- Create a long-term tax credit for emerging clean energy technologies to incentivize developing and deploying clean energy projects to meet growing AI demand.

**WASTE HEAT FROM DATA CENTERS**

- DOE should standardize data and reporting and create maps to match data centers with potential neighboring offtakers of heat to support the creation of thermal networks.
- Provide technical and financial assistance for the development of community-scale and utility-scale thermal networks, including supporting feasibility studies, engineering, and permitting work.
- Require data centers to reuse waste heat.

**WATER USE**

- Establish a water use reporting regime for data centers and develop metrics for water use effectiveness.
- Provide incentives for meeting stringent water use effectiveness targets.
- Provide incentives for using non-potable water.
- For federal procurement, require that cloud and data center providers serving federal workloads meet energy and water efficiency targets.

## Policy Context:

On energy use transparency, the old ways of thinking about Power Use Effectiveness at data centers are no longer useful: the technology sector has successfully squeezed all the efficiency out of building shells and heating, ventilation, and air conditioning (HVAC) systems. **NEW METRICS ARE NEEDED TO ANALYZE ENERGY EFFICIENCY, ESPECIALLY IN THE CONTEXT OF AI, BECAUSE NEW GENERATIONS OF SEMICONDUCTORS ARE RAPIDLY INCREASING PERFORMANCE PER WATT. INCREASINGLY, ENERGY EFFICIENCY IS NOT JUST ABOUT HARDWARE OR SOFTWARE COMPONENTS, BUT ABOUT THE INTEGRATION OF HARDWARE AND SOFTWARE.**

To encourage transparency on future energy use for transmission planning, some have suggested that data center developers provide more substantial financial deposits, but it is unclear whether that will meaningfully change incentives for extremely well-capitalized technology companies. Complementary disclosure requirements are likely needed.

On protecting ratepayers, the states are the laboratories of democracy, and there are different approaches ranging from large load tariffs to special contracts to new corporate entities that are sister organizations to utilities to deal directly with data centers. Arizona, Texas, and Virginia are some of the many states that have enacted elements of the proposed federal floor for protecting ratepayers listed above. Some communities may compete for data center development to boost economic development, so any federal floor should leave room for state and local governments to set their own policies.

Regarding grid reliability, in May 2026, NERC issued a Level 3 Essential Action Alert to address risks from rapid reductions in the electricity use of large loads and oscillations that are so quick that utilities struggle to respond.[277] NERC also provided voluntary guidelines to mitigate risks from large loads ahead of forthcoming reliability standards.[278] Just like large generators and transmission owners, large loads should be directly subject to NERC reliability standards. In July 2026, FERC directed NERC to complete work on requiring registration of large loads so they become subject to reliability standards.[279] Large loads should have ride-through requirements analogous to inverter-based resource standards to avoid mass tripping during disturbances. Transmission planners will need to better model data center behavior in planning studies.

Texas recently required large loads to provide detailed information about onsite backup generation so that ERCOT can see how much latent supply exists to substitute for grid power during emergencies. During grid emergencies, ERCOT may require large loads to either deploy onsite backup generation or curtail their load. Building on the Texas model, a federal requirement should call for new large loads to install equipment or technology that allows those loads to be curtailed remotely during firm load-shed events, as a condition of interconnection.

In support of a sustainable power strategy for AI, a new Electron Accelerator program will help meet community needs because Americans support data centers using clean energy by a 25-point margin and oppose data centers using fossil energy by a 16-point margin.[280] As described above in Benchmark #5.1, data centers should use new, clean energy instead of building behind-the-meter natural gas plants that will drive up the cost of natural gas for ratepayers.[281]

Most recently, in June 2026, FERC asked the six grid operators it regulates to either adopt certain reforms for large loads such as data centers or explain why their existing approaches for large loads are sufficient.[282] The reforms include:

- Considering alternative transmission technologies in transmission service application and study processes.
- Requiring transparency and avoiding cost shifting for large loads.
- Enabling co-location of large loads with generation and behind-the-meter generation.
- Facilitating new transmission services for flexible large loads.
- Outlining a pathway for interconnection of large co-located loads and generating facilities serving electrically proximate large loads.

FERC also asked the six grid operators to explain how they plan to ensure sufficient energy generation to meet demand from large loads.

[277] North American Electric Reliability Corporation. (2026, May). *Essential Action to Industry Computational Load Modeling, Studies, Instrumentation, Commissioning, Operations, Protection, and Control.* https://www.nerc.com/globalassets/programs/bpsa/alerts/level-3-computational-load-alert.pdf.

[278] North American Electric Reliability Corporation. (2026, May). *Risk Mitigation for Emerging Large Loads: Large Loads Working Group Reliability Guideline*. https://www.nerc.com/globalassets/our-work/guidelines/reliability/RG_Risk-Mitigation-For-Emerging-Large-Loads.pdf.

[279] Federal Energy Regulatory Commission. (2026, July). *Order Directing the North American Electric Reliability Corporation to File Reliability Standard(s) pertaining to Computational Load Integration,* 196 FERC 61,041 (Docket No. RD26-7-000). https://www.ferc.gov/media/e-1-rd26-7-000.

[280] Climate Power. (2026, February). *NEW POLLING: Research on AI Data Centers, Costs, and Pollution.* https://climatepower.us/news/new-polling-research-on-ai-data-centers-costs-and-pollution/.

[281] Chapter 6: Next-Generation Energy Technology Researched, Developed, and Built in America contains additional recommendations on complementary policies for long duration energy storage, next-generation geothermal energy, and nuclear energy.

[282] Federal Energy Regulatory Commission. (2026, June). *Fact Sheet: FERC Takes Action to Supercharge America's Grid Efficiency, Reliability, and a Bold Energy Future.* https://www.ferc.gov/news-events/news/fact-sheet-ferc-takes-action-supercharge-americas-grid-efficiency-reliability-and.



While these FERC actions are a laudable first step, there are several limitations. First, FERC's show cause orders only apply to the six grid operators under its jurisdiction: California Independent System Operator (CAISO), Independent System Operator New England (ISO-NE), Midcontinent Independent System Operator (MISO), New York Independent System Operator (NYISO), Pennsylvania-New Jersey- Maryland Interconnection (PJM), and SPP. Approximately one-third of the United States is not covered by an RTO or ISO. Those areas may choose to make some of these reforms, but the details may vary. For these areas, new policy is likely needed.

Second, FERC did not mandate that any specific reforms be implemented. For example, some states are leading on developing VPPs as an affordability solution, but there is no guarantee that the six RTOs/ISOs will take actions needed to support maximizing the use of VPPs. In fact, that is unlikely to happen on its own without federal direction. Benchmark #5.2 above describes how federal policy can help maximize the use of VPPs as an affordability solution. Third, action from Congress would reduce policy uncertainty from the risk of litigation or from future rollbacks. In summary, as RTOs/ISOs work through the steps required to comply with the June 2026 show cause orders, we cannot simply assume the show cause orders will deliver the value they aim to achieve. Federal policymakers should be prepared to ensure consumers are protected.

Regarding waste heat, reusing the waste heat from data center servers could help data centers reduce electricity use by 10%–30%, since much of the electricity demand is for cooling servers.[283] The waste heat could be used in thermal networks or by the data centers themselves, which, for example, is required in Germany. Participants in thermal networks could include shallow geothermal heat sources, waste heat from large buildings and campuses, data centers, municipal wastewater systems, and industrial and cold-storage facilities. Thermal networks can provide clean heating and cooling for residential and commercial spaces, low heat for light industrial and food processing, and heating for municipal facilities like pools, recreation centers, and wastewater plants.

Finally, on water use, about two-thirds of data centers are being built in areas with high levels of water stress.[284] The scale of water use by data centers can be on the order of what a town uses, but new cooling technologies can limit impacts. Federal reporting and transparency requirements, incentives for water efficiency, and use of procurement authorities can help alleviate water stress.

[283] Gardiner, D., Dixon, A., Kent, E., & Schuster, H. (2025, September). *Data Center Heat Reuse: The Opportunity for States*. David Gardiner and Associates. https://www.dgardiner.com/wp-content/uploads/2025/12/Data-Center-Heat-Reuse-The-Opportunity-for-States.pdf.

[284] Nicoletti, L., Ma, M., & Bass, D. (2025, May). *AI is Draining Water from Areas that Need it Most*. Bloomberg News. https://www.bloomberg.com/graphics/2025-ai-impacts-data-centers-water-data/?embedded-checkout=true.

**Challenge – Outdated wholesale power markets:** Wholesale power markets were built around large fossil and nuclear plants. Their design does not match a system containing resources like wind, solar, and batteries, which have near-zero marginal cost, are highly flexible, and can provide fast, digital grid services (e.g., fast ramping, voltage support, synthetic inertia, fast frequency response) that are only partially recognized and compensated today. It is not clear that generation should still set market prices. **OUTDATED MARKET STRUCTURES PROVIDE INADEQUATE INCENTIVES TO MAKE FULL USE OF THE AFFORDABLE AND ABUNDANT RESOURCES THE UNITED STATES HAS TO MEET INCREASED ENERGY DEMAND.** As with Benchmarks #5.2 and #5.3 on upgrading and expanding the electric grid, the case for modernizing wholesale power markets was strong even before demand from AI became an issue. However, data center load growth has added urgency to this long-standing need because better price signals can lower total system cost.

## Policy Options:

### ADEQUATELY VALUE NEW RESOURCES

- Convene experts to reconsider how wholesale power markets are structured. Identify solutions to better design market signals, given current technology to meet public interest goals. Based on the outcome of this Congressional convening, require energy, reliability, and capacity market reforms that will better integrate renewable energy, battery and thermal storage, storage-as-transmission, hybrid resources, DERs, and demand response in wholesale power markets. At a minimum, renewable energy and energy storage should be allowed to provide all ancillary services, and self-scheduling of generators should be reduced.
- Create federal guidance for valuing multi-hour and multi-day storage to support state regulators and grid operators. Ensure greater transparency regarding resource adequacy modeling and assumptions Direct DOE to provide technical assistance to RTOs/ISOs who seek to develop rate or market designs to incorporate expanded integration of innovative flexible resources, such as promoting tariff structures that compensate flexible demand resources for providing load shifting, congestion relief, and renewable integration services to the grid.
- Develop regulations for storage that mandate that storage as transmission services must also be able to participate in all wholesale energy, capacity, and ancillary service markets.
- To take advantage of the critical minerals-free grid resources provided by industrial heating/thermal energy storage, clarify that market transactions involving the purchase of electric energy for the purpose of conversion to thermal energy for subsequent resale as thermal or electric energy constitute wholesale transactions within the meaning of Section 201 of the *Federal Power Act* (16 U.S.C. 824), and/or amend Section 201(d) to define electricity purchases as wholesale transactions if the energy is resold as thermal or electric energy.

### GOVERNANCE & TRANSPARENCY

- Increase RTO/ISO transparency and stakeholder involvement and ensure a role for meaningful input and direction from states in decision-making to balance the influence of incumbent transmission owners and legacy resource types.
- Provide intervenor funding to public interest organizations so that communities can be represented in proceedings before federal and state utility regulators.

## Policy Context:

The *Federal Power Act* provides broad authority to FERC to regulate wholesale power markets. Policy leadership is needed to ensure markets adequately value new resources and provide the flexibility and reliability needed to meet today's energy demands. In the more than 30 years since the *Energy Policy Act of 1992* laid the groundwork for competitive wholesale power markets, much has changed. First, RTOs/ISOs have taken different approaches to operate their markets. Second, we have real-world experience to confirm whether the academic theories underpinning market structures work. Finally, with advancements in technology, both load and generation can be dispatchable. All these changes open the door to improved power market structures. Modernizing markets will make the electricity system more resilient to fuel disruptions, more adaptable to extreme weather and cybersecurity risks, and more attractive for investment in diverse, domestic resources. Of course, wholesale power markets are one piece of a larger puzzle.[285]

Modernizing markets would make the electricity system more resilient to fuel disruptions, more adaptable to extreme weather and cybersecurity risks, and more attractive for investment in diverse, domestic resources.

Public confidence in electricity sector regulation will increase with improved governance and transparency of RTOs/ISOs. These organizations are structured as nonprofit organizations in which incumbent transmission owners and legacy resource types often hold privileged roles on key committees that can block reforms that would support new technologies. Federal minimum governance standards for RTOs/ISOs can help ensure more effective markets across the country. Complementing RTO/ISO reforms, it will also be helpful for consumer and community groups to receive technical and financial assistance so they can participate in proceedings before federal and state energy regulators. Consumer and community buy-in on federal and state energy policy is a critical component of a clean energy economy.

[285] Chapter 6: Next-Generation Energy Technology Researched, Developed, and Built in America contains additional complementary policy recommendations for new technologies like LDES and renewable thermal energy.

**Challenge – Supply chain weaknesses:** To meet increased electricity demand, we need stable supply chains of clean energy and electric grid components and equipment. This is a cross-cutting issue. The costs of steel, copper wiring, and switchgear are all going up due to supply chain challenges. In many cases, tariffs shrink the supply chain and raise prices. An escalating trade war will make existing affordability challenges even worse. The boom in data center development is adding urgency to this challenge because they are competing for many of the same components and equipment.

## Policy Options:

- Extend and expand the 45X Advanced Manufacturing Production Credit:
  - Reaffirm long-term support for 45X for solar and storage manufacturing. Provide Production Tax Credits (PTCs) for domestically manufactured LDES components, including electrolytes, thermal media, tanks, heat exchangers, compressors, and mechanical assemblies.
  - Remove the 2027 termination for 45X for wind energy components to provide long-term certainty.
  - Expand 45X for key next-generation geothermal components, including drill bits; large diameter well casings and drill string components, including insulated drill pipes; high temperature, high pressure sensing and power electronics; geothermal electricity production equipment; heat exchangers; air-cooled condensers; and production well pumps.
  - Expand 45X for power transformers, switchgear, and grid-forming inverters.
  - Expand 45X for the production and incorporation of domestically produced high-performance rare earth magnets, which are critical for EVs, wind turbines, and many other applications. Provide a higher credit for recycled magnets.
  - Expand 45X for components of industrial heating technologies, including geothermal, solar thermal, electric heat pumps, and clean hydrogen.
- Extend and strengthen the Clean Electricity Investment Credit with the Domestic Content Bonus and high road labor standards. Ensure a continuing role for demand-side incentives to sustain domestic supply chains for clean energy and electric grid components and equipment.
- Provide additional funding for the Section 48C Qualifying Advanced Energy Project Credit.
- Direct DOE to supplement *Defense Production Act* (DPA) support with long-term purchase commitments between utilities and manufacturers to stabilize market demand and de-risk manufacturing expansions. Allow other DPA tools to be used, including price floors, price insurance, and equity investment, for clean technologies with appropriate guardrails and environmental review.
- Expand DOE EDF to invest in the manufacturing needed to develop the domestic supply chain for clean energy and electric grid components and equipment.
- Expand and incentivize the use of the U.S. Department of Labor (DOL) Registered Apprenticeship programs.
- Establish place-based initiatives in partnership with state policymakers and regional commissions to provide holistic support to expand advanced manufacturing for clean energy and electric grid components and equipment.

## Policy Context:

**FOCUSED INCENTIVES, CLEAR LONG-TERM POLICIES, AND SMART INVESTMENTS IN INFRASTRUCTURE AND THE WORKFORCE CAN BOTH REDUCE ENERGY COSTS AND STRENGTHEN U.S. ENERGY SECURITY.** These are all components of a successful supply chain strategy for the electric grid.

The *One Big Beautiful Bill Act* (OBBBA), passed in July 2025, included several new requirements regarding domestic content and the exclusion of prohibited foreign entities in a product's supply chain when accessing certain tax credit programs. The U.S. Department of Treasury should provide timely and clear guidance on how entities can fairly meet new legislative requirements.

Looking ahead, supply chains will likely remain global, but the United States should consider several factors in developing a domestic industrial strategy:

- Energy Security: Onshoring and friend-shoring key components can help reduce the risk that adversaries can use chokepoints against the United States.
- Technology Development: The United States can accelerate and own iterative innovation arising out of the manufacturing process for certain components.
- Jobs: Onshoring can help create more good jobs for communities across the country.[286]

Expanding registered apprenticeships helps develop a skilled, resilient workforce while improving retention and productivity. Because registered apprenticeships are employer-driven and tied to industry-recognized competencies, they directly target chokepoints where talent shortages and skills gaps undermine supply chain performance.

Finally, the expansion of advanced manufacturing faces barriers that incentives alone cannot solve, including insufficient grid infrastructure, siting and permitting barriers for facilities and enabling infrastructure, and workforce training and development barriers. Place-based initiatives will be required in collaboration with state policymakers and regional commissions. There are currently six federal multi-state regional commissions and authorities: the Appalachian Regional Commission (ARC), the Delta Regional Authority (DRA), the Northern Border Regional Commission (NBRC), the Southeast Crescent Regional Commission (SCRC), the Southwest Border Regional Commission (SBRC), and the Denali Commission. All regions of the country should have a multi-state regional commission to help with economic development.[287]

[286] Chapter 6: Next-Generation Energy Technology Researched, Developed, and Built in America and Chapter 7: A Nationally Secure, Globally Competitive Energy Sector contain additional recommendations to onshore and friend-shore critical supply chains.

[287] Chapter 2: Growing and Tribal Economies contains additional recommendations on equitable economic development.

BENCHMARK #5.5:

# A renewed electric grid catalyzes business investments in the industries of the future, including electric and autonomous vehicles.

**A RENEWED ELECTRIC GRID PROVIDES ELECTRICITY AS STRATEGIC INPUT, WHICH IS INCREASINGLY DECISIVE FOR SITING ADVANCED MANUFACTURING, INCLUDING FOR ELECTRIC AND AUTONOMOUS VEHICLES (EVs/AVs) AND BATTERIES, AS WELL AS FOR ADVANCED INDUSTRIAL PROCESSES THAT USE ELECTRICITY FOR LOW-TEMPERATURE HEAT.** When access to the electric grid is constrained, unreliable, or expensive, those manufacturing projects move to other regions. When the electric grid is digitized, expanded, and decarbonized, it can serve as a magnet for capital, talent, and supply chains.

**COMPLEMENTARY POLICIES ARE NEEDED TO SUPPORT EV DEPLOYMENT, WHICH IS STRATEGICALLY IMPORTANT TO THE U.S. ECONOMY FOR SEVERAL REASONS:**

- **FIRST, EV DEPLOYMENT WILL HELP HOUSEHOLDS WITH TRANSPORTATION AFFORDABILITY, AND IT WILL CREATE JOBS.**
- **SECOND, EV DEPLOYMENT WILL SUPPORT MORE RESILIENT SUPPLY CHAINS FOR A WIDE VARIETY OF U.S INDUSTRIES RANGING FROM AGRICULTURE TO CONSUMER GOODS TO NATIONAL DEFENSE.**
- **FINALLY, EV DEPLOYMENT CREATES DOMESTIC DEMAND FOR CRITICAL MINERALS AS WE SCALE UP SECURE CRITICAL MINERALS SUPPLY CHAINS IN THE UNITED STATES AND IN ALLIED NATIONS.**

The previous benchmarks addressed electric grid policies that will create a modernized and expanded electric grid capable of providing enough electricity to support advanced vehicle manufacturing. This benchmark covers the complementary policies needed to increase EV deployment to address issues related to transportation affordability for households and resilient supply chains for U.S. industries.[288] This section provides policy options for two key challenges:

1. Unaffordable gasoline
2. High diesel prices for freight




[288] Chapter 7: A Nationally Secure, Globally Competitive Energy Sector contains additional recommendations to increase U.S. energy security, including on critical minerals supply chains.

**Challenge – Unaffordable gasoline:** The conflict in Iran has created severe financial hardship for American households by driving fuel prices to levels not seen in nearly four years. This is just one of many examples of fuel price volatility. Higher gasoline prices act like a regressive tax. **FUEL IS A LARGER SHARE OF SPENDING FOR LOWER-INCOME HOUSEHOLDS, SO THEY FEEL THE IMPACT MOST ACUTELY. SURVEY DATA FROM MAY 2026 SHOW THAT 66% OF U.S. DRIVERS SAY HIGHER GAS PRICES HAVE MODERATELY OR SIGNIFICANTLY HURT THEIR ABILITY TO AFFORD OTHER EVERYDAY EXPENSES IN JUST THE PAST MONTH.[289] ABOUT 80% OF DRIVERS SAY THEY ARE ACTIVELY TRYING TO USE LESS GAS BY DRIVING LESS, AND MORE THAN 75% OF RESPONDENTS ARE LOOKING FOR WAYS TO SAVE ON GAS.[290]**

## Policy Options:

- Invest in public transportation to reduce the pressure on household budgets.
- Reauthorize EV purchase incentives and charging investments to support light- and medium-duty vehicles.
- Provide a rebate toward the purchase of a new vehicle on the basis of the vehicle's energy performance, measured in terms of miles-per-gallon-equivalent (MPGe).
- Provide incentives for Direct Current Fast Charging (DCFC) and charging consortia.
- Create national DCFC interconnection standards and provide incentives for their adoption.
- Develop a National Electric Vehicle Bidirectional Charging Roadmap.
- Encourage bidirectional charging systems as part of federal fleet procurement.

## Policy Context:

Transportation affordability is a major challenge for U.S. households. Improving public transportation will give people a real alternative to driving, which will lower household fuel spending and reduce exposure to gasoline price spikes. Reducing vehicle miles traveled would also ease congestion and make commuting cheaper and more reliable overall. A key strategy is to focus on evidence-based projects that improve ridership and accessibility.

Expanded EV deployment will also help reduce the impacts of fuel price volatility. For households that own vehicles, new and used EVs offer lower fuel and maintenance costs, which eases the strain on household budgets. Even compared to the last time fuel prices spiked due to the Russian invasion of Ukraine in 2022, the EV market is vastly different. EVs were 10% of new car sales in 2024, roughly twice as much as in early 2022.[291] Battery costs have fallen, and the used EV market has expanded.[292] Reauthorizing EV purchase incentives for new and used EVs will immediately help with transportation affordability as well as provide the larger economic competitiveness benefits described above to support domestic advanced vehicle manufacturing and secure critical minerals supply chains.

For households without home charging, supporting more DCFC infrastructure will expand low-cost travel options. Federal support for DCFC will reduce the capital cost for stations and can help increase station utilization. One strategy is to support charging consortia of multiple companies because they can share risk and aggregate demand for charging from fleets and from public use. Charging consortia can also coordinate more effectively with utilities and regulators on electricity tariffs and managed charging. The federal government can also develop national DCFC interconnection standards and provide incentives for their adoption. Doing so will reduce the soft costs of DCFC station development and will speed up deployment.

In addition to improving transportation affordability, EVs now offer important resilience benefits. Bidirectional charging is two-way energy flow between an EV and an external electrical system. V2H enables using an EV battery to power a residence during a blackout, and V2G facilitates selling stored energy back to a utility. Benchmark #5.2 described how EVs and charging infrastructure can be integrated into VPPs. Complementary policies are also needed to help scale up bidirectional charging. A National Electric Vehicle Bidirectional Charging Roadmap will be a federal blueprint that sequences the technical, regulatory, and market steps needed to advance bidirectional charging to a standard feature of EVs and charging networks. Elements include the development of grid safety standards, standardization of interconnection pathways and rate structures, and increased coordination between automakers and manufacturers of V2G/V2H hardware and software.[293]



[289] Schoenbauer, A. (2026, June). *Consumers React to Rising Gas Prices.* Numerator. https://www.numerator.com/resources/blog/consumers-react-rising-gas-prices/.

[290] Schoenbauer, A. (2026, June). *Consumers React to Rising Gas Prices.* Numerator. https://www.numerator.com/resources/blog/consumers-react-rising-gas-prices/.

[291] Isenstadt, A. & Slowik, P. (2025, April). *The International Council on Clean Transportation, U.S. passenger electric vehicle sales and model availability through 2024.* The International Council on Clean Transportation. https://theicct.org/publication/us-passenger-ev-sales-and-model-availability-through-2024-apr25/.

[292] Najman, L. (2026, February). *Used Electric Car Prices & Market Report — Q1 2026.* Recurrent. https://www.recurrentauto.com/research/used-electric-vehicle-buying-report.

[293] Chapter 2: Growing Rural and Tribal Economies and Chapter 3: Thriving, Affordable Resilient Communities contain additional policy recommendations on transportation to improve affordability and accessibility. Chapter 8: Accessible, Low-Cost Finance for a Clean Energy Future contains additional recommendations to make EVs more affordable.




**Challenge – High diesel prices for freight:** In 2026, contract-heavy shippers experienced immediate impacts from the diesel price shock through adjusted fuel surcharges, while carriers operating in the spot market faced even greater financial strain. Smaller carriers and owner-operators are absorbing higher upfront costs and frequently waiting weeks for reimbursement as spot rates adjust more slowly.

## Policy Options:

- Invest in national freight electrification corridors.
- Provide incentives for last mile fleet electrification charging.

## Policy Context:

The conflict in Iran has destabilized global oil markets and created a severe economic crisis for the long-haul freight industry. This is just the most recent example of how volatile diesel prices create vulnerabilities. American companies across the economy depend on the long-haul freight industry for affordable and reliable supply chains. This already prolonged energy shock is expected to persist, with analysts warning that crude oil market volatility will continue to pressure carrier margins regardless of when the conflict resolves.

The economic pain extends far beyond trucking companies. Higher fuel costs are being systematically passed through to freight bills. Retailers are warning that elevated fuel and freight costs are squeezing margins and will show up in higher prices for consumers, especially on food and other essentials. Farmers face compounded challenges as both farm equipment diesel costs and transportation expenses surge during planting season, leaving them to inevitably pass those costs to consumers.

For commercial fleet owners, electric heavy-duty trucks offer protection against diesel price volatility and lower fuel and maintenance costs. From a truck driver's perspective, electric trucks may be better to own, maintain, and drive. However, without charging infrastructure for heavy-duty vehicles in place, it is challenging for commercial fleets to take advantage of this opportunity for supply chain resilience. The most cost-effective approach involves shared charging hubs available to multiple fleets along major freight corridors. These hubs enable charging en route and serve regional and long-haul trucks from different fleets at the same locations, increasing utilization and cutting costs.

Connecticut, Delaware, Maryland, and New Jersey are collaborating through the Clean Corridor Coalition to build a $250 million zero-emission medium- and heavy-duty EV charging corridor along I-95. Federal support to expand this model nationwide will help shore up the supply chains of American industries.

States like California, Massachusetts, and New York also provide incentives for last mile fleet electrification charging. Often the programs are designed to provide funding for integrated projects that include both vehicles and charging infrastructure. These examples provide a good foundation for federal policy.

**BENCHMARK #5.6:**

# Communities are protected with a grid that is resilient to wildfire, extreme weather, and cyberthreats.

**CLIMATE-FUELED WILDFIRE AND EXTREME WEATHER ARE ALREADY STRESSING THE U.S. ELECTRIC GRID. UTILITY INVESTMENTS TO HARDEN THE ELECTRICITY DISTRIBUTION SYSTEM ARE ONE OF THE DRIVERS OF INCREASING ENERGY BILLS IN MANY REGIONS OF THE COUNTRY.**[294] Cyber-threats are also increasing due to expanding technological offensive capabilities and worsening geopolitical conflict.

Moreover, any plan for a strong, growing economy must address the climate-related financial costs we already face, even as we keep reducing harmful pollution to avoid far worse future impacts. As described above, the U.S. bulk electric system and electricity distribution systems are a particularly complex mix of investor-owned utilities, public power, and rural electric cooperatives governed by both federal and state law. This section provides policy options for two key challenges:

1. Grid vulnerabilities to wildfire, extreme weather, and cyberthreats
2. Wildfire Costs



[294] Wiser, R., Barbose, G., Gorman, W., O'Shaughnessy, E., Forrester, S., Donohoo-Vallett, P., Cappers, P., Deason J., Hledik, R., & Lam, L. (2026, April). *Retail Electricity Price Trends and Drivers: Data Update–2026 Edition.* Lawrence Berkeley National Laboratory and Brattle Group. https://eta-publications.lbl.gov/sites/default/files/2026-03/retail_price_trends_2026_edition.pdf.

**Challenge – Grid vulnerabilities to wildfire, extreme weather, and cyberthreats:** The wildfire crisis is spreading across the country. A hotter, drier climate and aging infrastructure are driving more frequent, destructive fires that threaten the electric grid.[295] The electric grid is also causing some wildfire ignition.

In addition to wildfire, climate-fueled extreme weather events include heat waves, freezes, storms, and floods. The number of billion-dollar weather and climate disasters has been increasing.[296] Ratepayers alone do not have the resources to harden energy infrastructure against all these climate-fueled threats because it would break many household budgets.

On cybersecurity, the U.S. vulnerabilities of electric, water, and telecommunications infrastructure are interconnected. A lack of coordination between federal and state governments also exacerbates vulnerabilities. Water systems are particularly decentralized and do not have the resources to ensure cybersecurity.

## Policy Options:

- Make it easier for electric utilities to remove hazard trees and vegetation growing near electric power line rights-of-way.
- Provide dedicated federal grants so that public power and rural electric cooperatives can deploy AI tools to help them with wildfire risk reduction, mitigation, response, and recovery.
- Restore and expand the Grid Resilience and Innovation Partnerships (GRIP) Program and the Grid Resilience State and Tribal Formula Grants.
- Clarify that not-for-profit and cooperative utilities that receive federal funding from FEMA to restore electric service after a major disaster may also conduct cost-effective hazard mitigation activities as part of power restoration.
- Reauthorize and expand the IIJA Rural and Municipal Utility Advanced Cybersecurity Grant and Technical Assistance Program (RMUC).
- Increase funding for the DOE Office of Cybersecurity, Energy Security, and Emergency Response (CESER) to work with utilities to address cyberthreats.
- Establish mandatory federal reliability and cybersecurity standards for interstate natural gas pipelines to improve gas-electric system coordination.

## Policy Context:[297]

The urgency of the wildfire crisis and the lack of available workforce to meet the immediate need point to a greater role for technology-based solutions. Utilities are demonstrating the power of combining sensors, helicopter and drone imagery, and satellite data with AI models to better identify and mitigate wildfire risks as well as to respond to, and recover from, wildfire events. Deployment is uneven, however, because of a lack of resources.

The federal government has a role to play as a partner to utilities in grid resilience, providing both technical and financial assistance, especially to public power authorities and rural electric cooperatives. IIJA created the RMUC program administered by DOE CESER. DOE CESER and FEMA are the primary federal entities currently sharing operational, hazard-focused risk information that can be directly applied to energy infrastructure hardening, land-use decisions, and investment prioritization. NOAA and other agencies provide additional hazard layers and guidance that state, local, Tribal, territorial, and private partners can overlay with their own asset data to ensure infrastructure resilience. In addition, NERC weaves climate- and weather-related resilience into its mandatory reliability standards and its ongoing risk-assessment and standards-development process through extreme-weather planning, facility ratings, resource adequacy, and NERC's risk-based standards pipeline.



[295] Americans for a Clean Energy Grid. (2025). *Fact Sheet: Wildfires and Transmission.* https://www.cleanenergygrid.org/portfolio/fact-sheet-wildfires-and-transmission/.

[296] Climate Central. (2026). *U.S. Billion-Dollar Weather and Climate Disasters.* https://www.climatecentral.org/climate-services/billion-dollar-disasters.

[297] Chapter 3: Thriving, Affordable, Resilient Communities contains additional recommendations to shore up the resilience of communities to wildfire and extreme weather. Chapter 4: Safe, Clean, and Prosperous Ecosystems contains additional recommendations on the role of the federal government in managing public lands. Chapter 7: A Nationally Secure, Globally Competitive Energy Sector contains additional recommendations on cybersecurity.

**Challenge – Wildfire costs:** Utilities are often just one spark away from bankruptcy. In addition to the cost in human lives, the financial impact of wildfires is enormous. Since 2018, utility returns have been flat in the West while in the East, utility returns broadly track indexes. Flat returns make capital more expensive just as more investments to harden the system are needed. But wildfire risk is increasing in the East too. Federal action is likely needed before this crisis gets worse.

## Policy Options:

- Work with the financial/insurance sector to develop standards that will help utilities be more proactive rather than reactive.
- Collect data from utilities on wildfire risk reduction measures so there is a common understanding of the comparative benefits of measures that utilities can take.
- Collect data from utilities on near misses so there is more transparency on actual wildfire risks.
- Create a voluntary federal insurance backstop to stabilize the insurance market and ensure continued electric reliability across high-risk wildfire areas. Access to the insurance backstop will be contingent on the utility following verifiable safety and risk reduction standards.
- Establish a Federal Wildfire Relief Fund to address marketplace uncertainty related to wildfire liability risk. Set a floor to create the market conditions for participants to continue to enter into contracts to build transmission Access to the fund will require a utility to demonstrate compliance with safety and risk reduction standards.

## Policy Context:

There is ongoing collaboration between the federal government and state regulators to address the wildfire crisis, including through the National Association of Regulatory Utility Commissioners (NARUC). Given the severity of the crisis, however, new federal policy to help all states respond more effectively will be beneficial. This includes developing safety and risk reduction standards, expanding data collection and data sharing, as well as working with the financial and insurance sectors to support utilities.

At the state level, California created a Wildfire Relief Fund that requires utilities to file and maintain approved wildfire mitigation plans that are regularly reviewed and updated for changing risk conditions. Utility eligibility for the fund also depends on governance reforms, including having a board safety committee, tying executive compensation to safety performance, and having a board-level safety reporting structure.

A Federal Wildfire Relief Fund can fill gaps where insurance markets fail and can be designed to reward compliance with mitigation standards, inspections, and safety certification. A national fund can create more uniform treatment across states and reduce the patchwork that currently exists across federal and state policies. To avoid moral hazard issues, eligibility will need to be conditioned on independently certified compliance with robust safety and risk reduction standards, ongoing audits, and a clear penalty for material noncompliance. The best wildfire mitigation plans are multi-risk, multi-benefit, and multi-stakeholder. To protect communities, landowners in the Wildland Urban Interface (WUI) can ensure they have defensible space around their homes.[298]

[298] Chapter 3: Thriving, Affordable, Resilient Communities contains additional recommendations on helping communities reduce wildfire risk.



CHAPTER 6:

# Next-Generation Energy Technology Researched, Developed, and Built in America

According to the International Energy Agency's (IEA) 2023 *Net Zero Roadmap*, roughly 35% of emissions reductions needed by 2050 will come from technologies still under development.[299]

While it will be critical to find ways to effectively deploy the technologies available today, it continues to be critical that the United States invest in the research, development, and demonstration (RD&D) of emerging technologies that will help close this gap and help the entire world decarbonize. The U.S. has led the world in energy innovation for over 100 years, with the technologies underlying solar energy, nuclear energy, hydraulic fracturing, enhanced geothermal, and more originating here. We can continue to lead the world in energy innovation, but we will not be able to do so under the status quo.

In this area, success is defined by the next generation of energy technologies invented, developed, and commercialized here in the United States instead of abroad. Industries will grow around these technologies, employing American workers and supporting local communities. The energy produced will be more affordable, reliable, clean, and secure than what our country depends on today, and the technologies produced here will be what the rest of the world uses to power their own economies.

To achieve these goals, however, the U.S. Department of Energy (DOE), our national labs, and research universities need to be empowered to develop and demonstrate promising technologies, along with developing a workforce ready to meet this challenge. The federal government will play a key role in cementing the U.S. as a world leader in energy innovation and deployment for years to come by fostering an innovation ecosystem that bridges the gap between the lab bench and the real world and helps promising technologies move from pilot, to demonstration, to commercialization.

**TO CREATE A THRIVING ECONOMY, THIS CHAPTER FOCUSES ON ACHIEVING THE FOLLOWING BENCHMARKS TO SUPPORT NEXT-GENERATION ENERGY TECHNOLOGY RESEARCHED, DEVELOPED, AND BUILT IN AMERICA:**

- **BENCHMARK #6.1:** The U.S. remains at the forefront of the research and development of next-generation energy technologies. | 164
- **BENCHMARK #6.2:** Technologies proven in the lab have a clear path to commercial scale. | 167
- **BENCHMARK #6.3:** America builds and sustains the workforce needed to research, produce, and deploy next-generation energy technologies. | 170
- **BENCHMARK #6.4:** The private sector invests more in emerging energy technologies, so projects are financed and built in the United States. | 173
- **BENCHMARK #6.5:** Regulatory frameworks keep pace with energy innovation and deployment. | 179

[299] International Energy Agency. (2023). *Net Zero Roadmap: A Global Pathway to Keep the 1.5 °C Goal in Reach, 2023* Update. https://www.iea.org/reports/net-zero-roadmap-a-global-pathway-to-keep-the-15-c-goal-in-reach.

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## NC–02



**I AM PROUD TO HAVE WORKED WITH SEEC INSTITUTE TO DEVELOP THE FOLLOWING CHAPTER ON NEXT-GENERATION ENERGY TECHNOLOGY RESEARCHED, DEVELOPED, AND BUILT IN AMERICA.** For over a century, the United States has led the world in energy innovation, but that progress is in jeopardy. If we want to remain at the forefront of the research and development of next-generation energy technologies, we must take concrete action now to foster our energy innovation ecosystem to ensure that we can meet the challenges of tomorrow.

As a legislator and a clean energy attorney, I have seen firsthand the power that clean energy technology has to transform economies and communities. I have represented the Research Triangle – a major hub of science and technology and home to some of the world's top research universities and institutions – throughout my entire career. In the North Carolina General Assembly, I worked to increase access to clean and affordable energy, address climate change, and protect our state's land, air, and water. I have continued this work in Congress, serving as Ranking Member of the House Committee on Science, Space, and Technology's Energy Subcommittee and working on this chapter with SEEC Institute.

Our nation's energy industry and innovation ecosystem are at an inflection point. We are seeing exponential energy demand growth while our electrical grid is reaching capacity and extreme weather events caused by climate change are straining current power sources. This stress on our energy production has been compounded by volatile federal funding cuts by the Trump administration, outdated regulatory frameworks, and an ever more complex geopolitical landscape, among other barriers.

Advancing resilient energy technology is fundamentally an economic issue. As Americans see energy prices skyrocket, clean energy technology offers real opportunities to reduce costs. Robust innovation and clean, affordable, and accessible energy can – and must – be achieved together. Investing in clean energy technology is one of the greatest tools at our disposal to strengthen our economy and our environment for the next generation. The Thriving Economy Project is taking America one step closer to a more affordable and more resilient future.

The following chapter addresses the challenges currently facing American energy technology innovation and offers substantive steps to reform the current system. The energy technology landscape is evolving, as are the demands of leadership in this sector. Progress now means moving promising technologies from the research lab to commercial scale, building the supply chains and workforce to support them, and modernizing the regulatory frameworks that govern how they get built. Maintaining the status quo is a choice to depreciate our research ecosystem and recklessly cede American energy dominance. The United States can seize this moment, and the recommendations included here can help us begin to walk that path.



BENCHMARK #6.1:

# The U.S. remains at the forefront of the research and development of next-generation energy technologies.



**A DURABLE AMERICAN INNOVATION ECOSYSTEM TURNS SCIENTIFIC DISCOVERY INTO COMMERCIAL LEADERSHIP, NEW INDUSTRIES, AND HIGH-QUALITY JOBS.** The following policies strengthen the foundations of that ecosystem with sustained federal investment in emerging energy technologies, frictionless collaboration between researchers and industry, and flexible program design that rewards results. This section provides policy options for three key challenges:

1. Volatile federal RD&D funding
2. Challenging partnerships with National Labs
3. Technology that is outpacing government mechanisms



**Challenge – Volatile federal RD&D funding:** Early-stage energy technologies require sustained, patient federal investment to reach commercial viability, yet U.S. funding for energy RD&D remains volatile, concentrated in a few coastal hubs, and insufficient to maintain global technology leadership.

## Policy Options:

- Increase and sustain federal RD&D funding across emerging clean energy technologies, including advanced nuclear, enhanced geothermal, carbon removal, clean hydrogen, and long-duration energy storage (LDES).
- Expand funding for the Advanced Research Projects Agency-Energy (ARPA-E) while preserving its risk-tolerant, commercialization-oriented structure.
- Launch a dedicated artificial intelligence (AI) for energy RD&D program within DOE and extend innovation incentives to companies developing AI software for energy applications.
- Fund regional clean energy RD&D through seed grants and incubators, with dedicated rural and place-based funding streams.
- Strengthen entrepreneurial incubators linked to the national lab system and establish consortia or other partnering mechanisms to help promising technologies find commercial partners and pathways.

## Policy Context:

Federal RD&D investment has historically produced economic benefits, with DOE analyses finding that every dollar of applied energy research generates multiple dollars in returns on investment.[300] Competitor nations, particularly China, are rapidly scaling public investment in the same technology categories, positioning their firms to dominate global markets for next-generation energy products.[301] Institutional design matters as much as funding levels. ARPA-E's track record of catalyzing private follow-on investment depends on its independent program director model. Place-based programs such as the National Science Foundation (NSF) Regional Innovation Engines and the Economic Development Administration (EDA) Tech Hubs are designed to build durable innovation ecosystems outside traditional areas.[302] **A DIVERSIFIED, TECHNOLOGY-INCLUSIVE PORTFOLIO, PAIRED WITH A DEDICATED AI FOR ENERGY PROGRAM THAT LEVERAGES DOE'S UNIQUE COMPUTING AND DATA ASSETS TO ACCELERATE INNOVATION, WILL ENSURE THAT AMERICAN COMPANIES CAPTURE EMERGING MARKETS AND THAT THE ECONOMIC BENEFITS OF THE ENERGY TRANSITION REACH EVERY REGION.** These policy options will strengthen the foundations of American energy innovation by anchoring new domestic supply chains, manufacturing facilities, and skilled workforces in communities across the country.

**Challenge – Challenging partnerships with national labs:** Small companies, startups, and university researchers face lengthy, inconsistent processes to access the technical capabilities of the national labs, while fragmented coordination and data systems limit the extent to which the country benefits from federally funded research assets. The DOE national laboratory system represents one of the country's most valuable innovation assets, yet the U.S. Government Accountability Office (GAO) has documented persistent barriers to technology transfer at DOE, including funding gaps, legal and administrative hurdles, and misalignment between DOE research and industry needs.[303] These barriers are particularly constraining for small- and medium-sized firms operating on compressed commercial timelines.

## Policy Options:

- Streamline national lab partnerships through expanded Cooperative Research and Development Agreements (CRADAs), voucher programs, and concierge models standardized across the lab system.
- **ESTABLISH A DOE FAST PASS AND TRUSTED PARTNER PROGRAM THAT CREATES A UNIVERSAL, EXPEDITED CONTRACTING PROCESS FOR PRIVATE-SECTOR PARTNERS WORKING ON CRITICAL RESEARCH AND DEVELOPMENT (R&D) PRIORITIES**.
- Create a committee to coordinate research directions across agencies, labs, universities, and industry, either as a traditional DOE-chartered Federal Advisory Committee (FAC) or as a body hosted by a nonprofit partner-such as the Foundation for Energy Security and Innovation (FESI)- that can draw on private and philanthropic support and engage industry stakeholders with greater flexibility.
- Build a federal data hub that makes publicly generated research data available for licensing under clear, standardized terms.

[300] Dowd, J. (2025, January). *Return on Investment Initiative Report*. United States Department of Energy, Office of Energy Efficiency and Renewable Energy. https://www.energy.gov/sites/default/files/2025-01/eere-iso-roi-report-2024.pdf.

[301] International Energy Agency. (n.d.). *World Energy Investment 2025: China*. https://www.iea.org/reports/world-energy-investment-2025/china.

[302] United States Department of Energy, Advanced Research Projects Agency–Energy. (n.d.). *Our Impact*. https://arpa-e.energy.gov/about/our-impact.

[303] United States Government Accountability Office. (2021, February). *Technology Transfer*, GAO-21-202. https://www.gao.gov/products/gao-21-202.

## Policy Context:

National labs and federally funded energy research programs need to be more accessible and useful to American industry, specifically through reforms that will shorten development timelines, lower the cost of innovation, and expand the set of American companies that can translate federal research into new products, services, and jobs. DOE's evaluation of the Small Business Voucher pilot found supporting evidence, based largely on participant reports, that streamlining contracting and simplifying access to national laboratory capabilities helped small clean energy firms advance commercialization.[304] The Materials Project, a DOE-supported open materials database, has been cited in over 32,000 peer-reviewed studies and serves more than 650,000 users, demonstrating how curated federal data resources can accelerate discovery across academic and commercial research.[305] At the same time, the Congressional Research Service (CRS) has identified persistent limitations in existing White House science and technology coordination mechanisms, including resource constraints and challenges in maintaining continuity across administrations, underscoring the value of a dedicated advisory committee focused on the energy innovation ecosystem.[306]

## Challenge – Technology that is outpacing government mechanisms:

raditional grant and contract vehicles, rigid appropriations structures, and siloed agency missions are often poorly matched to the pace and risk profile of modern energy innovation, limiting federal programs' ability to attract top performers and deliver commercial outcomes.

## Policy Options:

- Expand flexible funding mechanisms, including advance market commitments, challenge prizes, Other Transaction Authority (OTA), and multi-year appropriations authority.
- Eliminate rigid separations between DOE appropriations accounts (colors of money barriers) through cross-program planning authority and a unified innovation framework.
- Establish cross-cutting, cross-agency funding mechanisms that break down silos among DOE, NSF, the U.S. Department of Defense (DOD), the U.S. Department of Agriculture (USDA), and other relevant agencies and encourage collaborative teaming among labs, universities, and industry.

## Policy Context:

A more flexible, outcome-oriented federal innovation system will attract the strongest performers, accelerate commercialization, and give American companies a durable federal partner as they scale new technologies into global markets. OTA has been used effectively at the Defense Advanced Research Projects Agency (DARPA) and DOD to engage performers that would not otherwise compete for federal contracts.[307] Outside expert analysis has found that DOE's applied energy offices, organized by technology and constrained by appropriation account boundaries, focus primarily on incremental change and struggle to collaborate across silos.[308] Institutions like FESI, which operate outside traditional appropriations accounts, can broker joint initiatives across agency boundaries and illustrate how Congress has sought to address exactly these cross-silo coordination gaps. **PAIRING CONGRESS'S STATUTORY INNOVATIONS (FLEXIBLE FUNDING AUTHORITIES, MILESTONE-BASED OVERSIGHT, AND CROSS-CUTTING INSTITUTIONS) WITH THE IMPLEMENTATION CAPACITY TO USE THEM EFFECTIVELY WILL EQUIP FEDERAL MANAGERS WITH A MODERN INNOVATION TOOLKIT AND BUILD THE DURABLE INSTITUTIONAL FOUNDATION FOR AMERICAN INDUSTRIAL COMPETITIVENESS.**

[304] United States Department of Energy, Office of Energy Efficiency and Renewable Energy. (2020, May). *Evaluation of U.S. DOE Small Business Vouchers Pilot: Year 5 Outcomes and Impacts, Round 1, 2, & 3 Awardees.* https://www.energy.gov/sites/prod/files/2020/09/f78/SBV%20evaluation%205%20year%20outcomes_050520%20final.pdf.

[305] Duque, T. (2026, January). *Accelerating Discovery: How the Materials Project Is Helping to Usher in the AI Revolution for Materials Science.* Lawrence Berkeley National Laboratory. https://newscenter.lbl.gov/2026/01/13/accelerating-discovery-how-the-materials-project-is-helping-to-usher-in-the-ai-revolution-for-materials-science/.

[306] Congressional Research Service. (2023). *Office of Science and Technology Policy (OSTP): Overview*, R47635. https://crsreports.congress.gov/product/details?prodcode=R47635.

[307] Vadiee, A. & Garland, T. (2018, April). *The Federal Government's Other Transaction Authority.* Defense Advanced Research Projects Agency. https://acquisitioninnovation.darpa.mil/docs/Articles/Briefing%20papers%20THE%20FEDERAL%20GOVERNMENTS%20OTHER%20TRANSACTION%20AUTHORITY.pdf.

[308] Wong, J. & Hart, D. (2020). *Mind the Gap: A Design for a New Energy Technology Commercialization Foundation.* Information Technology and Innovation Foundation. https://itif.org/publications/2020/05/11/mind-gap-design-new-energy-technology-commercialization-foundation/.

BENCHMARK #6.2:

# Technologies proven in the lab have a clear path to commercial scale.



**TOO MANY AMERICAN ENERGY INNOVATIONS GET STUCK IN THE VALLEY OF DEATH, THE CRITICAL GAP BETWEEN LABORATORY SUCCESS AND COMMERCIAL DEPLOYMENT WHERE EARLY-STAGE RESEARCH FUNDING RUNS OUT BUT TECHNOLOGIES ARE NOT YET MATURE ENOUGH TO ATTRACT LARGE-SCALE PRIVATE INVESTMENT.** The policies in this benchmark are designed to close that gap. Ensuring that technologies invented in America are subsequently demonstrated and commercialized in America is both an economic imperative and a competitive one, keeping good jobs and supply chains on American soil. This section provides policy options for three key challenges:

1. Persistent funding gaps to reach deployment
2. Limitations on large-scale demonstrations
3. Lack of operational data and market confidence



**Challenge – Persistent funding gaps to reach deployment:** American energy innovation too often stalls between the laboratory and commercial deployment, particularly in the funding gap between ARPA-E-scale research and large-scale demonstration. **THE PIPELINE BETWEEN THE LAB BENCH AND COMMERCIAL SCALE HAS A STRUCTURAL GAP THAT PRIVATE INVESTORS DO NOT RELIABLY FILL.**[309]

## Policy Options:

- Establish a dedicated federal funding program, or Pilot bridge, to support energy technologies in the critical $5–$50 million pilot-scale range where they are too mature for early-stage research programs but not yet ready for full-scale DOE demonstration investment.
- Enable simultaneous use of DOE Office of Energy Dominance Financing (EDF) financing and federal grants so that promising companies can draw on complementary federal tools to fill capital gaps. Structure grant cost-share requirements so that federal support crowds in private capital.
- Create a Commercialization Readiness Fund that will provide flexible small-amount funding for field validation, manufacturing readiness assessments, and customer trials for technologies at the prototyping to demonstration levels.
- Leverage Small Business Innovation Research (SBIR) Phase III authority, which lets federal agencies make sole-source follow-on awards to firms that proved out a technology under earlier SBIR funding, without running a new competition and drawing on limited SBIR set-aside dollars.

## Policy Context:

The federal government has long played a critical role in moving breakthrough technologies from concept to market, including the early internet, hydraulic fracturing, and the solar technologies that now power millions of American homes. Building a reliable federal bridge across this commercialization gap will give promising technologies the chance to test, pilot, and make the real-world case for their continued development. Developing technologies carry risks, including long timelines, uncertain early markets, and high capital requirements that make them unattractive to private capital without a credible government partner to share that risk. For capital-intensive projects in the energy sector, including LDES, industrial technologies, advanced nuclear, and advanced geothermal, public funding can build confidence and provide a bridge toward scaling these technologies while unlocking private funds to continue commercialization, especially if we want the projects demonstrated and built here in America. Building that bridge is both an economic and competitive imperative.

Meanwhile, countries like China are making strategic, coordinated investments across the full innovation pipeline, including basic research, demonstration, and commercial deployment. **IF THE UNITED STATES DOES NOT MATCH THAT COMMITMENT AT THE CRITICAL MID-STAGE, BREAKTHROUGH TECHNOLOGIES DEVELOPED IN AMERICAN LABS WILL INCREASINGLY BE COMMERCIALIZED OVERSEAS, TAKING WITH THEM THE MANUFACTURING JOBS, SUPPLY CHAIN DEVELOPMENT, AND LONG-TERM ECONOMIC GAINS THAT SHOULD BELONG TO AMERICAN WORKERS AND COMMUNITIES.** These policies will help build the connective tissue of funding, supportive programs, and partnership opportunities across the scale-up gap.

**Challenge – Limitations on large-scale demonstrations:** For decades, the United States has been a leader in developing early-stage R&D but has struggled to move new technologies to commercial scale, with other nations capitalizing on American investment by bringing technologies stalled at home to maturity abroad.[310] After lab testing, prototyping, and piloting new technologies, the path to commercialization narrows at large-scale demonstration or first commercial operation. This stage is often where promising projects stall, after a technology has been proven but before it has the operating record that private sector funding requires.

## Policy Options:

- Leverage milestone-based payments tied to technical performance targets to support large-scale demonstrations for key technology areas, including but not limited to:
  - Enhanced and closed-loop geothermal systems.
  - Emerging industrial technologies, including high-temperature electric heating technologies and alternative feedstocks and chemistries for chemicals, cement, and steel.
  - LDES and heat storage.
  - Next-generation solar technologies, including tandem and perovskite-based systems.
  - Carbon removal, including direct air capture (DAC), mineralization, and marine carbon dioxide removal (CDR).
  - Fusion energy.
- Support the Office of Clean Energy Demonstrations (OCED) as a center of excellence for project management and oversight for large-scale projects at DOE.

[309] Arun, A. (2024, November). *The Project Finance Valley of Death*. Center for Public Enterprise. https://publicenterprise.org/the-project-finance-valley-of-death/.

[310] Wong, J. & Hart, D. (2020). *Mind the Gap: A Design for a New Energy Technology Commercialization Foundation*. Information Technology and Innovation Foundation. https://itif.org/publications/2020/05/11/mind-gap-design-new-energy-technology-commercialization-foundation/.

- De-risk next-generation geothermal development by funding the U.S. Geological Survey (USGS) for a new state-by-state geothermal resource assessment. Leverage DOE and DOD authority to use financial tools to de-risk heat resource exploration and provide project finance and offtake support.
    - Authorize a dedicated federal loan guarantee facility for first-of-a-kind and early-commercial manufacturing plants.

## Policy Context:

Federal funding and de-risking for demonstration-scale projects overcome a critical barrier in innovation and technology deployment, particularly for key technology areas. Demonstration projects are the mechanism by which promising technologies become commercially viable. They generate the operational data, supply chain experience, and investor confidence that no amount of laboratory or design work can provide. This stage of innovation investment is often referred to as the missing middle or the capital gap, since projects are often too large for early R&D or venture capital investment but too risky for large-scale private capital such as infrastructure or project finance.

**THE ECONOMIC CASE FOR DEMONSTRATION INVESTMENT IS COMPELLING. FIRST-OF-A-KIND INDUSTRIAL PROJECTS CREATE CONSTRUCTION JOBS, ANCHOR REGIONAL SUPPLY CHAINS, AND GENERATE THE OPERATIONAL KNOWLEDGE THAT SECOND AND THIRD MOVERS CAN BUILD UPON, REDUCING COSTS AND ACCELERATING DEPLOYMENT ACROSS THE ECONOMY.** For energy-intensive, trade-exposed industries like steel and cement, demonstration programs also support American competitiveness against international producers, helping American workers and manufacturers stay competitive in a global economy that increasingly values low-carbon production.

In the *Energy Act of 2020*, several large-scale demonstration programs were authorized across a range of energy technologies, and the *Infrastructure Investment and Jobs Act* (IIJA) created OCED, a central office to manage demonstration projects and be a center of excellence for project management and oversight at DOE. Maintaining this capability at DOE while developing complementary tools for de-risking project investment via loan guarantees and offtake mechanisms will help crowd in private investment at the critical demonstration stage and for first-of-a-kind commercial projects.[311]

**Challenge – Lack of operational data and market confidence:** Promising technologies often fail to bridge the gaps between RD&D and commercialization. The federal government controls vast physical assets including buildings, military installations, and research facilities. It also manages or interfaces with some of the largest and fastest-growing energy loads in the country, including data centers. These assets can be powerful platforms for real-world technology demonstration, generating the operational data and market confidence that emerging clean energy technologies need to reach commercial scale.

## Policy Options:

- Direct the General Services Administration (GSA) and DOE's Federal Energy Management Program (FEMP) to develop innovative programs that use federal buildings as living laboratories, deploying emerging technologies – such as long-duration and thermal storage and demand flexibility systems – and generating real-world operational data that can be shared with developers, investors, and other potential adopters.
- Develop a dedicated coordination platform to align demonstration projects, including advanced nuclear, LDES, and advanced geothermal, with the growing energy demands of data centers and other large new loads, using government tools such as seed financing, knowledge sharing, and offtake support to de-risk early deployment and attract private co-investment.

## Policy Context:

**THE UNITED STATES FEDERAL GOVERNMENT IS THE SINGLE LARGEST ENERGY CONSUMER IN THE COUNTRY, SPENDING AROUND $20 BILLION ANNUALLY ON ENERGY.[312] THAT SCALE IS A POTENTIAL ASSET. FEDERAL FACILITIES REPRESENT A PORTFOLIO OF REAL-WORLD DEPLOYMENT ENVIRONMENTS WHERE EMERGING TECHNOLOGIES CAN BE TESTED UNDER OPERATING CONDITIONS, GENERATING THE PERFORMANCE DATA AND OPERATIONAL TRACK RECORDS THAT PRIVATE DEVELOPERS AND INVESTORS NEED TO MOVE FORWARD WITH CONFIDENCE.** Programs like FEMP already have a mandate to improve federal energy performance. Expanding that mandate to explicitly include technology demonstration will extend its impact beyond immediate federal infrastructure needs.

At the same time, the rapid buildout of data centers and other large industrial loads is reshaping American electricity demand in ways that create both challenges and opportunities. These large, reliable loads are precisely the kind of anchor customers that can make otherwise risky projects financially viable. A coordinated federal platform that connects technology developers, large-load customers, and federal financing tools can dramatically accelerate the path from demonstration to commercial deployment, turning one of today's most complex grid challenges into a catalyst for next-generation American energy innovation.

[311] Crane, D., Chan, V., Shah, J., et al. (2023). *Pathways to Commercial Liftoff: Introduction.* United States Department of Energy. https://climateprogramportal.org/wp-content/uploads/2025/02/20230320-Liftoff-Introduction-vPUB-Final.pdf.

[312] United States Department of Energy. (2025, July). *Comprehensive Annual Energy Data and Sustainability Performance.* https://ctsedwweb.ee.doe.gov/Annual/Report/GovernmentWideSiteDeliveredEnergyUseAndCostsInAllEndUseSectorsConstantDollarsCurrentYear.aspx. (Government-wide site-delivered energy use and costs).

BENCHMARK #6.3:

# America builds and sustains the workforce needed to research, produce, and deploy next-generation energy technologies.



**NEXT-GENERATION ENERGY TECHNOLOGY WILL NOT RESEARCH, BUILD, OR DEPLOY ITSELF.** From the scientists and engineers in federally supported research, the construction trades and architecture and engineering professionals who build and design clean energy infrastructure, and the technical workforce in mineral surveying, processing, and component manufacturing, the occupations that make up the American workforce needed to develop, build, and deploy next-generation energy technology are at varying stages of readiness for the scale of work ahead. The policies in this benchmark are designed to build that workforce across the full pipeline, from internships and apprenticeships through advanced research careers, with particular attention to the rural and underserved communities that host an increasing share of next-generation energy infrastructure. This section provides policy options for two key challenges:

1. Insufficient worker training programs
2. Federal research workforce shortage





**Challenge – Insufficient worker training programs:** Building the workforce needed to support next-generation energy technologies requires sustained investment in training pipelines that begin well before a worker enters the field. Internships, apprenticeships, and pre-apprenticeship programs are among the most effective ways to develop technical talent across architecture, engineering, the construction trades, and related fields, but the cost of these programs can deter them from being put in place at scale.

## Policy Options:

- Ensure tax incentives are available for internships and apprenticeships in next-generation energy fields, including architecture, engineering, the construction trades, and clean energy manufacturing.
- Expand competitive grant funding through existing U.S. Department of Labor (DOL) and DOE workforce authorities to community and technical colleges, training providers, and labor-management partnerships for the occupations next-generation energy and advanced manufacturing depend on.
- Strengthen registered apprenticeship and pre-apprenticeship programs in next-generation energy and advanced manufacturing, building on models already in use such as the DOL-registered geothermal operations apprenticeship.
- Pair workforce training programs with strong labor standards, job quality requirements, and apprentice utilization requirements to ensure that next-generation energy careers are competitive, durable, and attractive to entering workers, and that these workers have a place to begin their careers and train on the job.

## Policy Context:

Federal support for high-quality workforce training programs that prepare workers for next-generation energy careers needs to be strengthened and expanded. The Work Opportunity Tax Credit (WOTC) and existing apprenticeship-related federal tax provisions provide a foundation that can be expanded to better cover next-generation energy fields. Registered apprenticeship programs at DOL have demonstrated strong outcomes in workforce retention and earnings progression, with apprenticeship graduates earning higher wages, staying in their fields longer, and advancing more quickly than comparable non-apprenticeship workers.[313,314]

[313] Federal Register. (2024, January). *Department of Labor Employment and Training Administration 29 CFR Parts 29 and 30 [Docket No. ETA-2023-0004] RIN 1205 AC13.* https://www.federalregister.gov/documents/2024/01/17/2023-27851/national-apprenticeship-system-enhancements.

[314] United States Department of Labor. (n.d.). Explore Registered Apprenticeship. https://web.archive.org/web/20260222084008/https://www.apprenticeship.gov/employers/explore-apprenticeship.

**Challenge – Federal research workforce shortage:** American leadership in next-generation energy technology depends on the strength of the federal research workforce – including and especially at DOE, the national laboratories, and federally funded research universities – and on the technical specialists who underpin domestic critical mineral development. Across these domains, compensation often lags comparable private-sector positions, and retention is complicated by inconsistent institutional support and uncertainty about long-term mission stability.[315] These pressures are particularly sharp in the critical-mineral disciplines, such as geology, mining engineering, and metallurgy, where the workforce is aging and the academic pipeline is contracting, producing far fewer graduates than the projected scale of domestic activity will require.[316] Similar workforce challenges are being felt across the energy industry. Federal investments in energy innovation and supply-chain security will remain bottlenecked by talent shortages unless the federal research workforce is retained and other critical workforce pipelines rebuilt.

## Policy Options:

- Ensure and implement competitive salaries through expanded direct hiring authorities, locality-based pay adjustments for high-cost research regions, and sustained funding for senior research positions at the national laboratories and DOE.
- Provide multi-year institutional support for research programs, and build researcher connections to real-world energy systems through partnerships with utilities, project developers, and manufacturing facilities.
- Prioritize NSF and DOE-DOL authorities under the *CHIPS and Science Act* and related laws to build critical minerals and manufacturing workforce pipelines, and extend equivalent curriculum and training support to other next-generation energy fields.

## Policy Context:

**DOE OPERATES 17 NATIONAL LABORATORIES, THE LARGEST FEDERAL RESEARCH ENTERPRISE IN THE ENERGY SECTOR, AND NATIONAL LAB STAFFING HAS BEEN SUBJECT TO SIGNIFICANT PERIODIC DISRUPTION.** The federal investments already committed across energy R&D and critical minerals – including those through tax credits, DOE loan and grant programs, and DOD procurement authorities – depend on a workforce capable of executing the projects those investments support. Section 10359 of the *CHIPS and Science Act* and Section 7002(K) of the *Consolidated Appropriations Act of 2021* both authorized programs to develop that workforce. However, gaps remain in implementation and funding. The cost of underinvestment is slow, compounding erosion of a research and technical base that has been a strategic American advantage for decades. We must build the compensation, institutional support, and talent pipeline needed to attract and retain top scientists, engineers, and technical specialists in federal and federally funded research and critical mineral careers.[317]




[315] Federation of American Scientists. (2024, November). *Strengthening the National Labs' Workforce.* https://fas.org/publication/strengthening-the-national-labs-workforce/.

[316] Hale, T. (2023, May). *The United States Needs More than Mining Engineers to Solve Its Critical Mineral Challenges.* Center for Strategic and International Studies. https://www.csis.org/analysis/united-states-needs-more-mining-engineers-solve-its-critical-mineral-challenges.

[317] United States Department of Energy. (n.d.). *National Laboratories.* https://www.energy.gov/national-laboratories.

BENCHMARK #6.4:

# The private sector invests more in emerging energy technologies, so projects are financed and built in the United States.



**THE HARDEST PART OF ENERGY INNOVATION IS NOT INVENTION; IT IS WHAT HAPPENS AFTER: MOVING A TECHNOLOGY FROM FIRST-OF-A-KIND TO COMMERCIAL SCALE, BUILDING THE SUPPLY CHAINS TO SUPPORT IT, AND FINDING THE EARLY CUSTOMERS WILLING TO BUY IT BEFORE IT HAS A TRACK RECORD.** The policies in this benchmark use the tools the federal government already has, including procurement, public-private partnerships, market-shaping authorities, and the EDF, to get next-generation technologies past that hardest stage and into American factories, on American grids, and on American job sites. This section provides policy options for six key challenges:

1. New technologies with few long-term markets or concrete agreements
2. Persistently high prices for lower carbon materials
3. Still nascent carbon removal technologies and markets
4. Financing American supply chains to scale
5. Lack of coordination across the federal-state nexus
6. Delayed federal action





**Challenge – New technologies with few long-term markets or concrete agreements:** New and innovative energy technologies struggle to scale for many reasons, but one of the most consistent is the absence of a credible long-term market and concrete agreements that allow companies developing these technologies to finance and invest in their infrastructure. That is particularly true for technologies whose cost of energy is higher than current market rates. Strong demand signals, including power purchase agreements (PPAs), can help promising technologies find a stable market and successfully commercialize.

## Policy Options:

- Authorize federal agencies and federal public power authorities to enter long-term PPAs and contracts for difference (CfD) for next-generation power generation, including enhanced geothermal, fusion, advanced and next-generation nuclear, and natural gas with carbon capture and sequestration (CCS).
- Site innovative power generation at federal facilities or on federal property, using the federal real estate footprint as a deployment platform for first-of-a-kind and first-few-of-a-kind projects.
- Direct federal public power authorities, including the Tennessee Valley Authority (TVA) and the DOE Power Marketing Administrations (PMAs), to deploy next-generation technologies through existing generation and transmission systems.

## Policy Context:

The most cost-effective forms of power generation are utility-scale solar, onshore wind, and combined-cycle natural gas.[318] **TO SCALE AMERICAN-DEVELOPED AND AMERICAN-MADE CLEAN ENERGY, NEW FORMS OF POWER GENERATION WILL NEED TO MOVE PAST FIRST-OF-A-KIND DEPLOYMENT TOWARD NTH-OF-A-KIND, OR FULL COMMERCIALIZATION.** Enhanced geothermal, fusion, advanced and next-generation nuclear, and natural gas with CCS are all promising and all likely to need long-term PPAs, CfDs, or other mechanisms to allow the federal government to procure clean energy over the long term to successfully scale. Some of these technologies have private sector PPAs in place. Only DOD can enter into long-term PPAs today, because the GSA is capped at 10-year utility service contracts.[319]

The federal procurement footprint that can support next-generation energy deployment is substantial. The federal government can act as a buyer of first resort, using its procurement footprint to provide an initial market for American companies developing promising technologies with favorable attributes, such as high-capacity factor, low carbon emissions, and dispatchability. The TVA, the nation's largest federally owned electric utility, has a long history of deploying nuclear energy, at one point building what was then the largest nuclear power plant in the world.[320] DOE's PMAs operate electrical systems and sell power generated by dams owned by the U.S. Army Corps of Engineers (USACE). DOD is moving to deploy a microreactor at Eielson Air Force Base and battery energy storage at remote facilities.[321,322] Each of these institutions, directed and supported by Congress, can serve as an early platform for next-generation energy deployment, and together they represent a procurement footprint that no private buyer can match.

[318] United States Energy Information Administration. (2026, April). *Levelized Costs of New Generation Resources in the Annual Energy Outlook*. https://www.eia.gov/outlooks/aeo/electricity_generation/pdf/LCOE_report.pdf.

[319] Kirshenberg, S., Jackler, H., Oakley, B., & Goldenberg, W. (2017, January). *Purchasing Power Produced by Small Modular Reactors: Federal Agency Options.* United States Department of Energy. https://www.energy.gov/documents/purchasing-power-produced-small-modular-reactors-federal-agency-options-final-1-27-17pdf.

[320] Maize, K. (2024, August). *History of Power: TVA's Browns Ferry Nuclear Power Plant Turns 50.* Power Magazine. https://www.powermag.com/history-of-power-tvas-browns-ferry-nuclear-power-plant-turns-50/.

[321] United States Air Force. (2025). *Eielson AFB Microreactor Pilot.* https://www.eielson.af.mil/microreactor/.

[322] United States Department of Energy, Office of Clean Energy Demonstrations. (n.d.). *DOE/DOD Long-Duration Energy Storage Joint Program: Awarded Projects*. https://www.energy.gov/cmei/oced/awarded-projects-doedod-long-duration-energy-storage-joint-program.

**Challenge – Persistently high prices for lower carbon materials:** Steel and cement, the materials used to build everyday infrastructure – from the roads we drive on and the cars we drive to the buildings we live and work in – are commodities. The manufacture of these materials, and other industrial materials, emits significant amounts of $CO_2$.[323,324] Cement alone accounts for roughly 7% of global $CO_2$ emissions, and steel another 7%–9%. However, lower embodied carbon building materials carry a significant cost premium over traditional materials and face a lack of familiarity from engineers and design professionals.

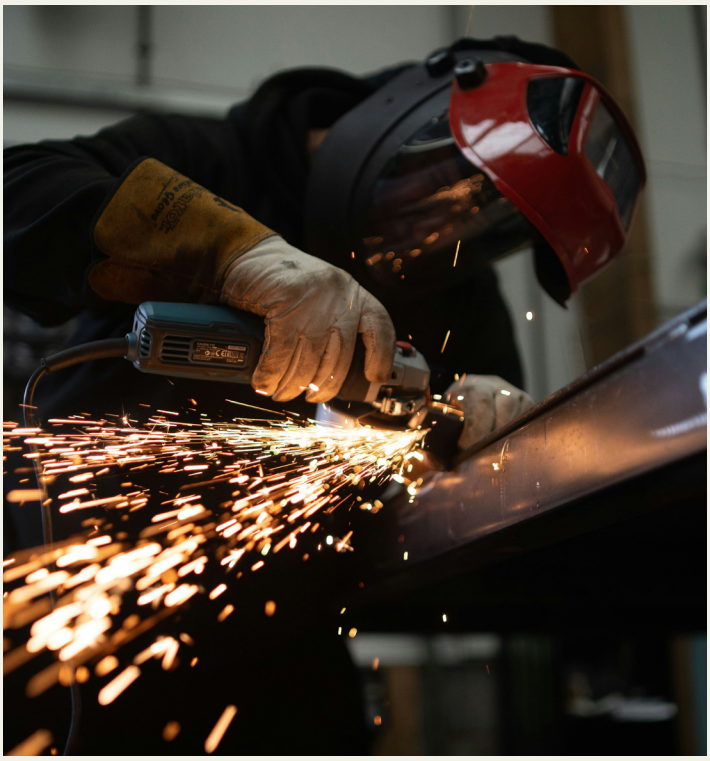
## Policy Options:

- Deploy low carbon materials through federal procurement and use – including through advance market commitments, low carbon materials preferences, and direct procurement – to demonstrate the effectiveness of low carbon materials in government-backed infrastructure.
- Support the development of environmental product declarations and help states develop specifications and standards for low carbon materials to ease adoption.
- Reinstate and expand funding for federal procurement programs already established to drive low carbon materials demand, ensuring flexibility in how the programs are administered and how materials are procured.
- Establish production incentives for low carbon materials tied to verified output, closing the operating cost gap that procurement alone cannot reach.

## Policy Context:

The federal government can act as a market mover for low carbon building materials through procurement, demand signaling, and standard-setting.[325] **ENGAGING IN ADVANCE MARKET COMMITMENTS OR OTHER PURCHASE AGREEMENTS DOES MORE THAN JUST PROVIDE A MARKET FOR LOW CARBON MATERIALS; IT GIVES COMPANIES MANUFACTURING THESE MATERIALS THE MARKET CERTAINTY NECESSARY TO SECURE FINANCIAL SUPPORT IN THE PRIVATE MARKET.**[326] The *Inflation Reduction Act* (IRA) established the $2 billion Low-Carbon Transportation Materials Grants program at the U.S. Department of Transportation (DOT) and authorized $2.15 billion for GSA to procure low embodied carbon materials for construction and renovation projects, alongside the U.S. Environmental Protection Agency's (EPA) Low-Embodied Carbon Labeling for Construction Materials program.[327] Funding for these programs was largely repealed by the *One Big Beautiful Bill Act* (OBBBA), cutting off the federal demand signal at the moment when private investment in domestic low carbon manufacturing capacity was beginning to scale.[328,329]

Reinstating and expanding this funding will restore the federal demand signal that domestic manufacturers of low carbon cement, low carbon steel, and other low embodied carbon materials need to plan, build, and operate at scale. This restoration is best paired with statutory flexibility in program administration and material specification to maximize implementability and meet market needs. It will also reinforce American leadership in a category that is increasingly subject to international competition, with the European Union, the United Kingdom, and other trading partners moving forward on carbon border adjustment mechanisms (CBAM) and procurement standards that will shape global markets for low carbon construction materials over the coming decade.



[323] Hasanbeigi, A. (2021, May). *Global Cement Industry's GHG Emissions.* Global Efficiency Intelligence. https://www.globalefficiencyintel.com/new-blog/2021/global-cement-industry-ghg-emissions.

[324] Hasanbeigi, A. (2025). *Steel Climate Impact 2025: An International Benchmarking of Energy and GHG Intensities. Global Efficiency Intelligence.* https://www.globalefficiencyintel.com/steel-climate-impact-2025-an-international-benchmarking-of-energy-and-ghg-intensities.

[325] Kubiak, L. et al. (2025, February). *Not Set in Concrete.* Natural Resources Defense Council. https://www.nrdc.org/sites/default/files/2025-02/Not_Set_in_Concrete_IB_locked.pdf.

[326] Ho, A. & Taylor, J. (2021, June). *Using Advance Market Commitments for Public-Purpose Technology Development.* Belfer Center for Science and International Affairs. https://www.belfercenter.org/publication/using-advance-market-commitments-public-purpose-technology-development.

[327] United States Department of Transportation, Federal Highway Administration. (2022). *Low-Carbon Transportation Materials Grants Program.* https://highways.dot.gov/media/58081.

[328] Inflation Reduction Act of 2022, Pub. L. 117-169, §§ 60116, 60503 (2022); One Big Beautiful Bill Act, Pub. L. 119-21, §§ 60015, 60021, 60024 (2025). https://www.congress.gov/117/plaws/publ169/PLAW-117publ169.pdf.

[329] Sabin Center for Climate Change Law and Environmental Defense Fund. (2025). *IRA Section 60503 – Funding for Low-Carbon Materials at Federal Facilities.* https://iratracker.org/programs/ira-section-60503-funding-for-low-carbon-materials-at-federal-facilities/.

## Challenge – Still nascent carbon removal technologies and markets:

If we hope to meet our climate ambitions, gigaton-scale CDR will be needed by 2050 to offset emissions from hard-to-abate sectors and to draw down legacy CO2 already in the atmosphere. While American companies are leading the development of engineered carbon removal technologies, including DAC, enhanced mineralization, and managed carbon sinks, these technologies are not deployed at scale. Further, these technologies face a significant cost premium with DAC currently running roughly $170 to nearly $740 per ton. Further, the voluntary carbon market (VCM) remains small and fragmented, while monitoring and verification standards are still evolving and maturing, and project developers cannot assemble the capital required for first-of-a-kind plants without long-term revenue certainty.[330]

## Policy Options:

- Use reverse auctions, in which CDR suppliers compete on price per ton, to drive cost reductions and reward the lowest-cost durable removal pathways.
- Authorize multi-year offtake contracts across a portfolio of removal pathways to give developers the long-term revenue certainty required to finance first-of-a-kind plants.
- Establish a tiered procurement approach to pull a diverse set of technologies down the cost curve, recognizing that early-stage technologies require different procurement structures than commercially mature ones.
- Support the development of measurement, monitoring, reporting, and verification (MMRV) standards, an area where the United States has an opportunity to set the global benchmark and ensure credit integrity across the market.

## Policy Context:

As a first buyer for carbon removal, the federal government can give American CDR companies the market certainty necessary to secure financial support in the private market. After it was established by Congress for Fiscal Year (FY) 2023, the $35 million DOE CDR Purchase Pilot Prize, the first government CDR purchasing program in the world, announced 24 semifinalists in May 2024 across four removal pathways, with Google pledging to match DOE's purchases dollar-for-dollar.[331,332,333,334]

While the program itself was not rescinded by OBBBA, the broader pause and cancellation of DOE clean energy awards has created significant uncertainty about whether Phases 2 and 3 will proceed.[335] Reauthorizing and expanding the program, including long-term offtake authority and sustained annual procurement volumes, will set the industry up for success and ensure American companies remain the global leaders in carbon removal. While these policies alone will not guarantee deployment or success, they will set the federal government up as the anchor buyer for high-quality, durable carbon removal, establishing standards, catalyzing private demand, and giving project developers the long-term revenue certainty needed to scale.

## Challenge – Financing American supply chains to scale:

American clean energy manufacturers face two intertwined challenges: gaps in domestic manufacturing capacity across the supply chain and significant price volatility driven by foreign producers. Without a deliberate effort to build domestic manufacturing capacity across multiple battery chemistries, suppliers, and component types, federal investment in clean energy technologies will continue to scale foreign supply chains rather than American ones. And without protection from foreign-driven price volatility, American mining, processing, and component manufacturing companies cannot secure the long-term financing required to scale, even when domestic projects are technically and commercially sound.

## Policy Options:

- Reestablish tax credits and requirements for domestic content sourcing to drive private investment in manufacturing capacity for solar midstream products, materials critical for long-duration storage, and high-efficiency turbines and compressors for industrial applications.
- Amend the 45X Advanced Manufacturing Production Credit to include adders that reward chemistry and supplier diversity, so that new, promising battery chemistries can scale.
- Establish a strategic resource reserve program, prioritized for financial price stabilization rather than physical

[330] United States Department of Energy. (2023, April) *Pathways to Commercial Liftoff: Carbon Management*. https://climateprogramportal.org/wp-content/uploads/2025/02/20230424-Liftoff-Carbon-Management-vPUB_update4.pdf.

[331] United States Department of Energy, Office of Fossil Energy and Carbon Management. (2024, May). *Carbon Dioxide Removal Purchase Pilot Prize*. https://www.energy.gov/hgeo/funding-notice-carbon-dioxide-removal-purchase-pilot-prize.

[332] Carbon Gap Tracker. (2025, November). *Government Procurement: EU–US Comparison*. https://tracker.carbongap.org/regional-analysis/eu-us-comparison/government-procurement/.

[333] Al-Shamma, M., Elizalde, D., & Jacobs, J. (2024, June). *DOE Advances Carbon Dioxide Removal Procurement: Phase 1 Awards*. Bipartisan Policy Center. https://bipartisanpolicy.org/blog/doe-advances-carbon-dioxide-removal-procurement-phase-1-awards/.

[334] Spock, R. (2024, March). *Our Pledge to Support Carbon Removal Solutions*. Google. https://blog.google/company-news/outreach-and-initiatives/sustainability/pledge-to-support-carbon-removal-solutions/.

[335] Wu, A. & Smith, A. (2026, January). *One Year into the Trump Administration: DOE Awards Cancelled and Programs Stalled*. Federation of American Scientists. https://fas.org/publication/doe-awards-cancelled-programs-stalled/.

stockpiling. This reserve should be paired with long-term federal offtake and procurement contracts to give producers demand certainty against foreign driven price volatility.

- Use OTA to support novel sectors like the advanced nuclear fuel cycle, critical minerals processing, and virtual power plant (VPP) aggregation, where conventional grant or contract authorities are too rigid.

## Policy Context:

By scaling federal public-private partnerships and authorizing a flexible suite of market-shaping tools, we can build domestic manufacturing capacity and stabilize prices and demand for critical minerals and emerging technology supply chains. The IRA demonstrated that strong, durable manufacturing tax credits can catalyze rapid private investment in domestic clean energy manufacturing, but coverage gaps remain across major segments of the supply chain, particularly for solar midstream, next-generation solar, and certain grid components. The 45X Advanced Manufacturing Production Credit and the 48C Qualifying Advanced Energy Project Credit provide a strong foundation. Expanding their coverage to next-generation solar and other underrepresented components and structuring them to reward diversity rather than just volume, will extend their impact across the technologies that will define the next decade of American energy innovation.

On the market side, a strategic reserve focused on price stability, paired with long-term federal offtake, can provide the price and demand certainty that private capital requires. DOD has recently expanded its use of equity, debt, and procurement authorities for critical minerals. This includes a preferred equity position in MP Materials, a roughly $35.6 million strategic investment in Trilogy Metals, and the use of *Defense Production Act* (DPA) Title III authorities.[336,337] DOE holds analogous authorities, as demonstrated in its restructured Lithium Americas loan, but it has not deployed them as systematically.[338] These recent deals show that the tools are available, but a case-by-case approach carries risks of market distortion. With proper guardrails in place and through transparent, broadly available structures, technology-neutral application of these tools at DOE, paired with new authorities where existing ones are insufficient, may close the gap between American and Chinese state finance for the supply chains that underpin next-generation energy technologies.

**Challenge – Lack of coordination across the federal-state nexus:** Federal clean energy innovation programs can land in states without prior coordination on workforce, supply chain, permitting, or industrial planning. This can result in delay, duplication, and missed opportunities to use existing state capacity. **STATES HAVE SHOWN SIGNIFICANT CAPABILITY TO PLAN FOR AND ACCELERATE CLEAN ENERGY INNOVATION WHEN GIVEN RESOURCES AND A COORDINATING FRAMEWORK, BUT FEDERAL PROGRAM DESIGN TOO OFTEN TREATS THEM AS RECIPIENTS RATHER THAN CO-DESIGNERS, LEAVING REGIONAL CLEAN ENERGY STRENGTHS UNDERUTILIZED.**

## Policy Options:

- Support new state-level innovation planning, looking to lessons from recent programs such as the Climate Pollution Reduction Grants (CPRG), and implement these efforts through planning grants and implementation funds tied to state strategies that integrate workforce development, supply chain buildout, permitting modernization, industrial decarbonization, and next-generation energy infrastructure deployment.
- Ensure engagement of states in the design phase of federal innovation and deployment programs, before solicitations are issued, so that federal program design reflects regional capacity, technology strengths, and economic development priorities.
- Authorize and fund cooperative federalism arrangements, including co-financing structures with state energy financing authorities and tax credit alignment between federal and state incentive programs.
- Support regional clean energy innovation through targeted federal investment in regional RD&D, including small seed grants and developmental support, such as incubators, that help states identify local technology strengths and build innovation ecosystems aligned with regional economic development goals.

## Policy Context:

States vary widely in the types of clean energy technologies represented in their innovation systems, their existing industrial base, their workforce, and the regional economic development priorities they bring to federal partnerships. One-size-fits-all federal program design often fails to take advantage of regional strengths. The result is slower deployment, less effective programs, and weaker constituencies for federal innovation investment over time. It is critical to build the federal-state partnership infrastructure that engages states as full participants in clean energy innovation, both before federal programs are designed and after they are deployed.

[336] United States Department of Defense. (2025, August). *Office of Strategic Capital Announces First Loan Through DoD Agreement with MP Materials to Secure Critical Materials Supply Chain.* https://www.war.gov/News/Releases/Release/Article/4270722/office-of-strategic-capital-announces-first-loan-through-dod-agreement-with-mp/.

[337] Trilogy Metals. (2025, October). *Trilogy Metals Announces Strategic Investment by U.S. Federal Government*. https://trilogymetals.com/news-and-media/news/trilogy-metals-announces-strategic-investment-by-us-federal-government/.

[338] United States Department of Energy. (2025, September). *Department of Energy Restructures Lithium Americas Deal to Protect Taxpayers and Onshore Critical Minerals.* https://www.energy.gov/articles/department-energy-restructures-lithium-americas-deal-protect-taxpayers-and-onshore.

**Challenge – Delayed federal action:** DOE EDF is the federal government's primary tool for financing innovative and commercially available clean energy technologies. The Title 17 Clean Energy Financing Program's eligibility framework has not kept pace with the diversity of clean energy innovation. Additionally, project timelines lack predictability, and conflicts of interest and risk management policies are not always transparent. Further, the State Energy Financing Institution (SEFI) authority, which is designed to drive locally led clean energy projects through federal financing, has been underutilized, with no SEFI-backed projects yet financed through EDF.[339] A May 2025 GAO report on EDF's application process found average application timelines of over two years, pointing to the need for stage-based "shot clocks" and clearer applicant status communication.[340]

## Policy Options:

- Modernize Title 17 eligibility by broadening the definition of *new and significantly improved technology and regional variation* requirements to ensure promising technologies remain eligible for EDF funding.
- **ESTABLISH PREDICTABLE, STAGE-BASED, TIME-BOUND REQUIREMENTS FOR EACH MAJOR PHASE OF THE LOAN APPLICATION PROCESS, PAIRED WITH STRONGER STATUTORY REQUIREMENTS FOR APPLICANT STATUS UPDATES WHILE ENSURING THAT STAFF TIME IS FOCUSED ON QUALITY APPLICATIONS.**
- Strengthen transparency through statutory requirements for updated conflict of interest policies, a published high-level Foreign Entity of Concern (FEOC) policy, and an enhanced Annual Portfolio Status Report covering portfolio composition, risk trends, and application pipeline activity.
- Expand SEFI eligibility beyond state-level entities to include sub-state jurisdictions and quasi-governmental entities, and enable EDF partnership with other federal programs with a history of engagement with these entities. Establish a clear designation pathway, defray third-party advisor costs for SEFI sponsors, and allow partnerships with private aggregators to assemble portfolios of distributed projects.
- Anchor the Energy Infrastructure Reinvestment (EIR) Financing Section 1706's authorization and appropriations in regular order, funding the program in the future through annual appropriations rather than budget reconciliation.

## Policy Context:

EDF backs clean energy projects that are technically sound and close to commercial but still too large or too novel for private lenders to finance alone. It administers Title 17, the Advanced Technology Vehicles Manufacturing (ATVM) Program, the Tribal Energy Loan Guarantee Program (TELGP), and Section 1706, and retains substantial lending authority. These recommended reforms are less about creating new capacity than making fuller use of what already exists.

These recommended reforms will work together, with demands on EDF likely to increase as a result. Broadening eligibility while tightening application timelines increases the volume and pace of work EDF must absorb, even as GAO has flagged that recent staffing reductions threaten the availability of experienced personnel.[341] It will be critical that the office scale administrative capacity with its caseload. With that resourcing and staffing in place, these reforms can unlock more of EDF's existing capacity.

[339] United States Department of Energy, Office of Energy Dominance Financing. (2026, June). *EDF Projects*. https://www.energy.gov/edf/edf-projects.

[340] United States Government Accountability Office. (2025, May). *DOE LOAN PROGRAMS: Actions Needed to Address Authority and Improve Application Reviews*, GAO-25-106631. https://www.gao.gov/assets/gao-25-106631.pdf.

[341] United States Government Accountability Office. (2025, September). *Tribal Energy Finance: Changes to DOE Loan Program Would Reduce Barriers for Tribes*, GAO-25-107441. https://www.gao.gov/products/gao-25-107441.

BENCHMARK #6.5:

# Regulatory frameworks keep pace with energy innovation and deployment.



**SOME OF THE MOST SIGNIFICANT OBSTACLES TO DEPLOYING NEXT-GENERATION ENERGY TECHNOLOGY HAVE NOTHING TO DO WITH THE TECHNOLOGY ITSELF.** They are regulatory frameworks written for an earlier era, permitting processes that take longer than project build timelines, and liability rules that have not caught up with what is being built. The policies in this benchmark aim to fix those frameworks without weakening the safety standards or the public's engagement on what gets built where. This section provides policy options for three key challenges:

1. Limited CDR infrastructure and regulation
2. A Nuclear Regulatory Commission (NRC) that has not kept pace with shifting nuclear technology
3. Unclear federal jurisdiction and standards for hydrogen



**Challenge – Limited CDR infrastructure and regulation:** Carbon capture and CDR technologies depend on a network of pipelines, injection wells, and long-term geologic storage that the United States has not yet built at scale. The regulatory framework governing this infrastructure is incomplete, creating uncertainty for project developers, insurers, and host communities, and limiting private investment in carbon management infrastructure even where the underlying technology is mature.

## Policy Options:

- Direct the Pipeline and Hazardous Materials Safety Administration (PHMSA) to finalize national $CO_2$ pipeline safety rules, addressing the unique characteristics of $CO_2$ transport that existing oil and gas pipeline safety frameworks do not fully address.
- Resource EPA to clear the Class VI Underground Injection Control permitting backlog and to support state agencies seeking Class VI primacy, expanding the number of states with the authority and capacity to permit geologic $CO_2$ storage.
- Restore provisions of the Greenhouse Gas Reporting Program (GHGRP) or develop a comparable reporting mechanism for sequestered $CO_2$, to provide MMRV integrity for the 45Q carbon removal tax credit and the carbon removal market.
- Establish long-term liability rules for $CO_2$ stored past project end-of-life to give developers and insurers the certainty they need to invest in long-duration storage.
- Clarify agency jurisdiction for emerging $CO_2$ removal pathways, including marine CDR, where current regulatory frameworks do not clearly assign permitting authority.

## Policy Context:

Carbon management infrastructure presents a different regulatory challenge than most energy infrastructure. $CO_2$ storage commitments extend across decades, well past typical project operating lifetimes, and require regulatory frameworks designed for that timescale. Geologic storage formations frequently cross state boundaries, requiring interstate coordination mechanisms that do not currently exist. Marine carbon removal pathways operate in jurisdictional gaps that no single agency clearly manages today. And public confidence in carbon management depends on a transparent, durable measurement and verification system. **ESTABLISHING CLEAR, COMPREHENSIVE REGULATORY AND LIABILITY FRAMEWORKS FOR CARBON MANAGEMENT INFRASTRUCTURE – INCLUDING $CO_2$ TRANSPORT, GEOLOGIC STORAGE, AND CDR – AS WELL AS AN ADEQUATE MARKET FOR CREDITS, WILL ENSURE CDR IS ON THE PATHWAY TO FULL SCALE.**

**Challenge – An NRC that has not kept pace with shifting nuclear technology:** The NRC was created to ensure that nuclear technology is deployed safely, and that mission remains essential. However, policies and procedures established in the years since the NRC was founded have left the agency with a framework that can be slow and difficult to scale across the range of advanced reactor designs, microreactors, and small modular reactors now coming forward.

## Policy Options:

- Direct the NRC to develop a modified permitting regime for smaller-scale pilots and demonstrations, such as microreactors, maintaining safety protections while reflecting the smaller risk profile of these designs.
- Amend Section 189a of the *Atomic Energy Act*, making hearings discretionary, rather than mandatory, for uncontested matters with previously approved designs, thereby freeing NRC resources for genuine safety reviews.
- Direct the Advisory Committee on Reactor Safeguards' (ACRS) focus toward novel and safety-significant matters.

## Policy Context:

The advanced nuclear sector is at an inflection point. Multiple first-of-a-kind projects have been announced, and several have advanced through early stages of NRC review, while a generation of new reactor designs is positioned to support clean energy deployment, industrial process heat, and resilience at federal facilities. But material barriers to commercialization exist within the NRC process. *The Accelerating Deployment of Versatile, Advanced Nuclear for Clean Energy (ADVANCE) Act*, signed into law in 2024, set a new regulatory direction for the NRC, and implementation is underway. Building on that foundation through targeted statutory reforms and sustained oversight will ensure a regulatory framework that supports innovation and scales deployment without compromising the safety and transparency the public expects from nuclear regulation.[342]

[342] Accelerating Deployment of Versatile, Advanced Nuclear for Clean Energy (ADVANCE) Act of 2024, Pub. L. 118-67, div. B. https://www.congress.gov/118/plaws/publ67/PLAW-118publ67.pdf.



## Challenge – Unclear federal jurisdiction and standards for hydrogen:

Clean hydrogen can play an important role in decarbonizing hard-to-abate sectors like fertilizer production, heavy industry, refining, long-distance aviation, and marine shipping. However, the regulatory framework governing hydrogen production, transport, and storage is underdeveloped. There are no comprehensive federal safety standards for hydrogen pipelines, agency jurisdiction for hydrogen infrastructure permitting is fragmented, and existing regulations developed for natural gas do not reflect the unique properties of hydrogen.

## Policy Options:

- Direct PHMSA to develop comprehensive safety standards for hydrogen pipelines, addressing both new-build hydrogen infrastructure and the safe retrofit of existing natural gas pipelines for hydrogen transport.
- Authorize and fund DOE research into the feasibility and safety of repurposing existing natural gas pipeline infrastructure for hydrogen transport, including materials compatibility, leakage monitoring, and end-use considerations.
- Invest in mapping and defining geologic storage potential for hydrogen.
- Resolve current ambiguity around agency jurisdiction for hydrogen permitting through interagency coordination and statutory clarification.

## Policy Context:

The IIJA established the $7 billion Regional Clean Hydrogen Hubs (H2Hubs) program at DOE, supporting demonstration and early deployment of clean hydrogen production, transport, and use.[343] Several hubs are now in early implementation, but their progress has been slowed by uncertainty around supporting infrastructure and the regulatory framework that will govern hydrogen at scale.

The pattern across these programs is consistent: federal investment is moving forward, but regulatory and infrastructure clarity is not keeping pace. Without comprehensive federal safety standards, clear permitting pathways, and credible long-term liability frameworks, hydrogen deployment will continue to face the kind of uncertainty that deters private investment and delays projects that could otherwise move forward. Building this regulatory foundation now is the most efficient way to ensure that the federal investment already committed to clean hydrogen yields the deployment outcomes Congress intended. Updated regulatory infrastructure is needed to enable safe, large-scale clean hydrogen deployment.

[343] United States Department of Energy, Office of Clean Energy Demonstrations. (n.d.). *Regional Clean Hydrogen Hubs (H2Hubs)*. https://www.energy.gov/cmei/regional-clean-hydrogen-hubs-0.



CHAPTER 7:

# A Nationally Secure, Globally Competitive Energy Sector

## Energy security is national security.

Reliable and affordable energy systems power American homes, industries, military installations, and emerging technologies, while supporting economic growth, technological leadership, and financial stability for hardworking families. In an era of intensifying geopolitical competition and rapidly growing electricity demand, the United States has an opportunity to build the world's most secure, affordable, and reliable energy system: one that powers economic growth, strengthens defense readiness, supports emerging technologies, and reinforces American leadership. However, no country can build a secure energy future alone. Working with allies and partners to strengthen supply chains, develop common standards, and expand markets for high-quality technologies will reduce costs, improve resilience, and ensure the United States, and not our competitors, help shape the rules governing the global energy and economic systems.

**UNLIKE A FOSSIL FUEL-BASED ENERGY SYSTEM, WHICH DEPENDS ON CONTINUOUS GLOBAL FUEL SUPPLY CHAINS THAT ARE VULNERABLE TO GEOPOLITICAL SHOCKS, PRICE VOLATILITY, AND SUPPLY DISRUPTIONS, A MODERN CLEAN ENERGY SYSTEM IS BUILT PRIMARILY THROUGH INVESTMENTS IN INFRASTRUCTURE DESIGNED TO OPERATE FOR DECADES. WHILE CLEAN ENERGY TECHNOLOGIES REQUIRE SECURE SUPPLIES OF CRITICAL MINERALS AND MANUFACTURED COMPONENTS, THESE MATERIALS ARE LARGELY NEEDED DURING CONSTRUCTION AND DEPLOYMENT RATHER THAN AS ONGOING FUEL INPUTS. THIS SHIFT FUNDAMENTALLY REDUCES AMERICA'S LONG-TERM STRATEGIC EXPOSURE TO FOREIGN SUPPLY DISRUPTIONS, WHILE CREATING AN OPPORTUNITY TO BUILD A MORE RESILIENT ENERGY SYSTEM POWERED BY DOMESTIC RESOURCES AND STRENGTHENED THROUGH TRUSTED PARTNERSHIPS WITH ALLIES.**

As the war in Iran, political changes in Venezuela, and Russia's invasion of Ukraine compound the energy risks associated with fossil fuels, we have a generational opportunity to treat our energy system, including the grid, as a strategic national asset by investing in new, cleaner, more secure alternatives. Even though the U.S. produces more oil and gas than any other country, we are still vulnerable to price shocks linked to these geopolitical events. We cannot drill our way to energy security and must prioritize new and innovative solutions. To achieve this, we must strengthen our domestic industrial base, secure supply chains through onshoring and friendshoring, invest in modern and resilient infrastructure, and protect America's scientific and technological edge. It also means prioritizing working with allies and partners to reduce dependence on adversaries seeking to control global energy markets and ensuring high standards for transparency, security, labor, and environmental protections where the U.S. invests. It requires distinguishing between areas of legitimate security concern – particularly regarding the People's Republic of China (PRC) – and areas where economic cooperation will continue to benefit U.S. industry. As energy systems become more interconnected and digitized, investing in cybersecurity to safeguard critical infrastructure at the cutting edge puts the U.S. on the path to a secure and reliable energy system.

Meeting these challenges will require more than isolated policy responses. It will require a shared understanding of risk and opportunity across the federal government, industry, and key stakeholders, especially as increasing climate impacts such as extreme weather further exacerbate this risk. Establishing clear and transparent risk frameworks to understand complex risks exacerbated by worsening climate change, with support from a well-funded scientific community – including fully-funded agencies like the National Science Foundation (NSF), National Oceans and Atmospheric Administration (NOAA), and United States Geological Survey (USGS) – can help government agencies, utilities, manufacturers, and private sector partners prioritize investments, align standards, and direct resources toward the most significant vulnerabilities while maintaining affordability, reliability, and innovation. America's energy future can be secure, affordable, and globally competitive if the nation builds systems that are resilient to disruption and worsening climate impacts, capable of meeting rising demand, and anchored in domestic strength and trusted partnerships.

**TO CREATE A THRIVING ECONOMY, THIS CHAPTER FOCUSES ON ACHIEVING THE FOLLOWING BENCHMARKS TO SUPPORT A NATIONALLY SECURE, GLOBALLY COMPETITIVE ENERGY SECTOR:**

- **BENCHMARK #7.1:** The United States has a resilient, high-value critical minerals supply chain that delivers essential inputs for clean energy, national security, and key industries. | 184
- **BENCHMARK #7.2:** Workers across the country can access and secure jobs in energy-related sectors, and scientific experts have the resources to drive innovation. | 189
- **BENCHMARK #7.3:** Energy infrastructure is secure and resilient, supported by robust cybersecurity capacity. | 192
- **BENCHMARK #7.4:** Investors and industry stakeholders actively invest in and expand clean energy operations in the United States. | 197
- **BENCHMARK #7.5:** The United States maintains military readiness by adapting to evolving supply chains and climate impacts like extreme weather and wildfire. | 202
- **BENCHMARK #7.6:** The United States is a trusted diplomatic partner on global energy issues with the tools to address complex, dynamic challenges. | 205

CONGRESSIONAL LEAD:

POLICY EXPERT: JULIA GREENSFELDER AND ERIC FINS

# Rep. George Whitesides

## CA–27



**IN MY DISTRICT IN NORTHERN LA COUNTY, I HAVE SEEN FIRSTHAND HOW CLIMATE CHANGE AND ENERGY AFFORDABILITY HAVE BECOME INSEPARABLE CHALLENGES THAT IMPACT MY CONSTITUENTS EVERY DAY.**

Across the American West, increasingly severe wildfires, prolonged heat waves, drought, and grid instability are no longer distant environmental concerns. They are direct threats to public safety, economic security, and the functioning of modern society. My community has experienced devastating firestorms, strained emergency response systems, rising insurance costs, repeated power shutoffs, and growing uncertainty around the reliability of critical infrastructure. Hospitals, schools, manufacturers, military installations, small businesses, and working families all depend on reliable and affordable energy systems that can withstand these increasingly complex threats.

These challenges also reveal a broader national security reality. The risks we face today extend well beyond the traditional geopolitical threats. Climate-driven disasters can disrupt supply chains, damage critical infrastructure, undermine military readiness, strain emergency response systems, and destabilize regional economies. As someone who co-founded an organization focused on solving America's wildfire crisis, I have seen how these cascading risks affect communities long after the flames are extinguished.

At the same time, the war with Iran has once again demonstrated how vulnerable global energy markets are to geopolitical instability. Energy price shocks quickly translate into higher costs, supply disruptions, and economic uncertainty for American families and businesses. When instability in one region of the world can affect affordability and reliability here at home, energy dependence becomes a strategic liability.

But this moment also presents an enormous opportunity.

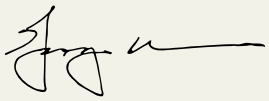
For the first time in generations, the United States is within reach of a more resilient, secure, and independent energy future. Advances in clean energy, advanced manufacturing, grid modernization, energy storage, and domestic supply chains give America the opportunity to strengthen our economy while reducing strategic vulnerabilities that come from dependence on fossil fuels. If we make the right investments now, we can build an energy system that is more reliable, more affordable, more resilient to wildfires and other disasters, and less dependent on adversarial nations.

This is not simply an environmental challenge. It is an economic and strategic imperative. The countries that lead in energy technology, advanced manufacturing, grid infrastructure, and critical mineral supply chains will shape the global economy and geopolitical balance for decades to come.

The United States has extraordinary advantages in this moment: world-leading innovators, research institutions, workers, entrepreneurs, and natural resources. But maintaining that leadership will require long-term investment, strategic coordination, and a renewed commitment to American innovation and industrial strength.

That is why I am proud to contribute to SEEC Institute's Thriving Economy Project. The ideas in this chapter reflect both the urgency of the challenges before us and the opportunities available if we act with purpose and ambition. This work is not intended to be the final word, but rather an invitation to continue the conversation about how America can build a more affordable, resilient, clean, and globally competitive energy future.

If we get this right, the United States can emerge stronger, safer, and better prepared for the challenges of the decades ahead.



BENCHMARK #7.1:

# The United States has a resilient, high-value critical minerals supply chain that delivers essential inputs for clean energy, national security, and key industries.



**CRITICAL MINERALS, AND OTHER CRITICAL MATERIALS SUCH AS COPPER, ELECTRICAL STEEL, AND ALUMINUM, PLAY AN INCREASINGLY IMPORTANT ROLE IN SUPPORTING ENERGY TECHNOLOGIES, ADVANCED MANUFACTURING, AND DEFENSE CAPABILITIES.** As demand grows and supply chains become more complex, ensuring reliable access to these resources has become a central component of U.S. economic competitiveness and national security. This section provides policy options for three key challenges:

1. Insufficient domestic supply and processing capabilities
2. Inefficient use and reuse of domestic resources and supply chain components
3. High U.S. standards that are more expensive to comply with than competitors' lower standards



## Challenge – Insufficient domestic supply and processing capabilities:

The United States lacks domestic supply and processing capabilities and is reliant on imports for critical minerals needed to secure our energy system, including some from key competitors. The USGS Mineral Commodity Summaries 2025 determined that the United States was 100% dependent on net imports for at least 15 critical minerals and that at least 28 critical mineral commodities had a net import reliance greater than 50% of consumption.[344] Beyond the imports of the raw minerals themselves, the U.S. lags behind on refining, processing, and separating. We are not only dependent on other countries for the minerals but also for the ability to turn these minerals into a usable product. Further, perennial underfunding and understaffing at federal agencies are causing delayed permitting and environmental review processes, limiting development of a domestic supply chain.

## Policy Options:

- **ESTABLISH A PERMANENT OFFICE OF GLOBAL ENERGY SECURITY (OGES) WITH ADEQUATE FUNDING AND STAFF AS A COMPONENT OF THE WHITE HOUSE EXECUTIVE OFFICE OF THE PRESIDENT (EOP), STRUCTURED SIMILARLY TO THE OFFICE OF THE NATIONAL CYBER DIRECTOR (ONCD).** The office will ensure the United States advances a coherent, whole-of-government strategy to secure global energy systems, critical material supply chains, and international energy markets in ways that strengthen U.S. domestic clean energy resource mobilization, economic competitiveness, national security, and geopolitical influence.[345]
- Expand domestic content incentives to include strategic components not currently covered by federal programs, including transformer materials, solar glass, inverters, and key grid equipment.
- Expand domestic content requirements to include qualifying content from trusted allies.
- Establish, where appropriate and feasible, government-backed offtake agreements and strategic price support mechanisms for energy-transition and defense-related critical materials, as defined by the *Energy Act of 2020*. Determine, where appropriate, a price floor that will be applicable sector-wide and be material specific. This may include facilitating negotiations with relevant private sector entities to secure offtake agreements where feasible and strategic.
- Establish a framework for domestic mining projects. The framework should include strong environmental and labor protections, including protections for special places like the Boundary Waters; regulatory clarity; clear opportunities for community engagement; structured incentives and benefit agreements for impacted communities; respect for Tribal sovereignty; and predictable timelines to enhance production and processing of critical minerals in the U.S. where feasible and appropriate.
    - Amend the *General Mining Act of 1872* to increase certainty for the domestic mining industry while strengthening protections for taxpayers, affected communities, and the environment.
    - Crack down on imports of illegally mined materials, including those that cause deforestation and displace Indigenous communities.
- As part of the process to identify the USGS list of critical minerals, bolster the USGS Earth Mapping Resource Initiative (EarthMRI) to identify untapped domestic resources through expanded geological surveying, improved data transparency, and integration of emerging data sources to inform public and private sector investment decisions. Empower EarthMRI to improve data collection on underground geothermal heat resources, which often rely on an overlapping set of geological surveys and measurements.
- Conduct recurring national critical materials stress tests with unclassified summaries, similar to the Federal Reserve model, to assess the impact of disruption of access to critical materials on U.S. economic security. Establish strategic stockpiles for materials identified as high risk.
- Expand and target tax credits, loan guarantees, and other financial incentives to support domestic mineral processing, refining, and advanced manufacturing, including consideration of novel financing mechanisms such as equity co-investment, where appropriate, to accelerate strategic projects.
- Establish a national material tracing and certification system for critical minerals and related products to ensure imports meet high environmental, labor, and governance standards, while enabling U.S. producers to compete on a level playing field globally. Prioritize minerals where lack of clarity and an unlevel playing field with competitors is an impediment to stable import systems.
- Facilitate long-term supply agreements and strategic partnerships with allied and partner countries, also known as friendshoring, to secure access to critical materials and processed and refined materials not available domestically, reducing exposure to adversarial supply chains.
- Utilize the *Defense Production Act* (DPA) with clear, transparent authorities to scale domestic critical mineral and rare earth magnet processing, production, and associated supply chains, addressing critical gaps in downstream manufacturing capacity.
- Focus the U.S. Department of Defense (DOD) Office of Strategic Capital's (OSC) authorities and investment decisions on high-priority critical minerals projects and partnerships with trusted allies and partners, while better aligning its activities with efforts being advanced via other instruments of economic statecraft. This should include coordination with the U.S. Department of Energy's

[344] United States Department of the Interior, United States Geological Survey. (2025, March). *Mineral Commodity Summaries 2025*. https://pubs.usgs.gov/periodicals/mcs2025/mcs2025.pdf.

[345] Many of the recommendations included throughout this chapter could be carried out by OGES, so the inclusion of OGES in this section is not meant to imply its sole focus should be on critical mineral-related issues.

(DOE) Office of Energy Dominance Financing (EDF) for loans, as well as the Export-Import Bank (EXIM) on export financing, the U.S. Development Finance Corporation (DFC) on upstream mining and processing investments, and the U.S. Department of State on critical minerals diplomacy initiatives.

## Policy Context:

**UNFETTERED ACCESS TO CRITICAL MINERALS IS A NATIONAL SECURITY PRIORITY ACROSS CLEAN ENERGY, DEFENSE, SEMICONDUCTORS, AND ADVANCED MANUFACTURING SECTORS.** Administrations across both parties agree that critical minerals are vital to 16 critical infrastructure sectors.[346,347] **HOWEVER, DESPITE THEIR IMPORTANCE TO THE EVERYDAY LIVES OF AMERICANS – FROM SMARTPHONES AND MEDICAL DEVICES TO CARS AND THE DEFENSE EQUIPMENT PROTECTING OUR COUNTRY – WE DEPEND ON EXPORTS FROM FOREIGN COUNTRIES TO ACCESS NEARLY ALL THESE CRITICAL MINERALS.**

Even though some U.S. allies such as Canada and Australia support significant critical minerals mining and processing capabilities, the International Energy Agency (IEA) found that China controls 60% of global mining output, 91% of global production at the separation and refining stages, and for 19 out of 20 strategic minerals, China is the leading refiner, controlling 70% of the market.[348]

China has a history of using their dominance in the critical minerals sector as a strategic advantage to advance their geopolitical goals. In 2010, the PRC restricted rare earth exports to Japan over the Senkaku/Diaoyu Islands, a disputed island territory.[349] This impacted global prices and access to these resources for many countries. In 2023 and 2024, the PRC restricted critical minerals for semiconductor production globally.[350] And in April 2025, in response to the tariffs imposed by President Trump, the PRC implemented new export controls on critical minerals, impacting critical industries around the world, including auto, advanced manufacturing, and defense.[351,352] In October 2025, the PRC announced the government would need to approve all exports of rare earths, further escalating government control of these minerals for political gain.[353]

Building out critical minerals supply chains both in the U.S. and with our allies and partners is critical for our security. It creates jobs, bolsters American manufacturing, and allows American workers to lead next-generation technology development. Responsible development of these resources, taking into account the risks to impacted communities and the environment, will provide access to foundational materials that help power the economy while minimizing the economic disruption from international supply chains.

Simply put, the United States does not have deposits of all critical minerals necessary for today's modern economy. We must prioritize strong relationships with allies and partners vital to these supply chains, maintain the highest quality of environmental, social, and governance standards for minerals mined and processed in the U.S. and overseas, and ensure that frontline workers most exposed to the risks associated with mining are protected and adequately compensated.

**Challenge – Inefficient use and reuse of domestic resources and supply chain components:** The United States needs to more efficiently use domestic resources and reuse valuable supply chain components. Even with the U.S. federal government focused on rapidly expanding critical minerals supply chains outside of China, the United States will not be able to compete if we do not champion new approaches and innovation.

## Policy Options:

- Authorize and fund DOE's Office of Manufacturing and Energy Supply Chains (MESC).
- Establish a national critical materials recovery strategy focused on mine waste, industrial byproducts, and end-of-life products.
- Invest in existing capacity and technologies that separate rare earths from recycled magnets and generate new magnets from the recycling process.
- Develop and implement a national Extended Producer Responsibility (EPR) framework for batteries and critical mineral-containing products like electronic waste (e-waste), requiring manufacturers to finance and manage end-of-life collection and recycling systems.
- Increase investment in research, development, and demonstration (RD&D) of recycling and recovery technologies, particularly for rare earth magnets, where current processes are underdeveloped but critical to long-term supply resilience. Expand federal funding to scale domestic recycling

[346] The White House. (2026, January). *Adjusting Imports of Processed Critical Minerals and Their Derivative Products into the United States*. https://www.whitehouse.gov/presidential-actions/2026/01/adjusting-imports-of-processed-critical-minerals-and-their-derivative-products-into-the-united-states/.

[347] The White House. (2024, April). *National Security Memorandum on Critical Infrastructure Security and Resilience*. https://www.presidency.ucsb.edu/documents/national-security-memorandum-critical-infrastructure-security-and-resilience.

[348] Kim, T., Dhir, S., Dasgupta, A., & Scanziani, A. (2025, October). *With new export controls on critical minerals, supply concentration risks become reality*. International Energy Agency. https://www.iea.org/commentaries/with-new-export-controls-on-critical-minerals-supply-concentration-risks-become-reality.

[349] Camba, A. (2025, April). *A federal critical mineral processing initiative: Securing U.S. Mineral independence from China*. War on the Rocks. https://warontherocks.com/a-federal-critical-mineral-processing-initiative-securing-u-s-mineral-independence-from-china/.

[350] Camba, A. (2025, April). *A federal critical mineral processing initiative: Securing U.S. Mineral independence from China*. War on the Rocks. https://warontherocks.com/a-federal-critical-mineral-processing-initiative-securing-u-s-mineral-independence-from-china/.

[351] Baskaran, G. & Schwartz, M. (2025, April). *The Consequences of China's New Rare Earths Export Restrictions*. https://www.csis.org/analysis/consequences-chinas-new-rare-earths-export-restrictions.

[352] Waldersee, V. & Steitz, C. (2025, June). *China's rare earth export curbs hit the auto industry worldwide*. Reuters. https://www.reuters.com/business/autos-transportation/some-european-auto-supplier-plants-shut-down-after-chinas-rare-earth-curbs-2025-06-04/.

[353] Bureau of Industrial Security and Import and Export Controls of the Chinese Ministry of Commerce. (2025, October). *Notice 2025 No. 61: Announcement of the Decision to Implement Controls on Exports of Rare Earth-Related Items to Foreign Countries*. https://cset.georgetown.edu/publication/mofcom-notice-2025-61/.

infrastructure, including battery recycling, electronics recovery, and secondary mineral markets, with a focus on scaling technologies that recover rare earth elements and enable closed-loop manufacturing.

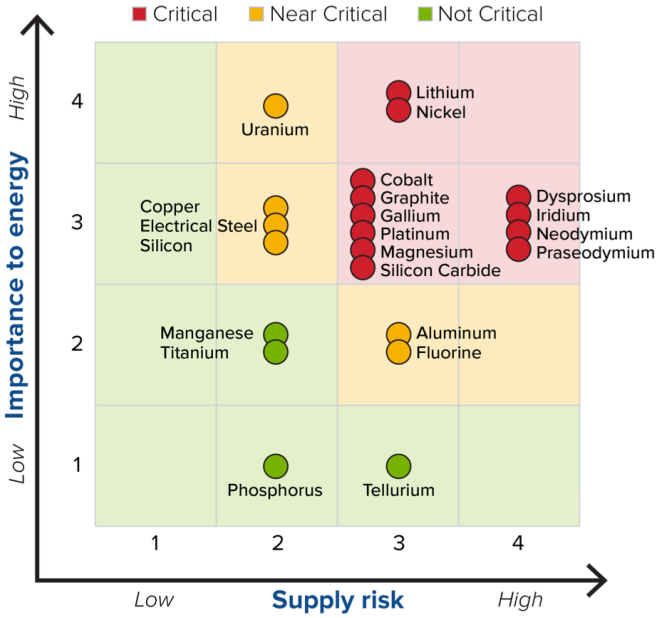
- Increase investment in RD&D of recycling and recovery technologies to extract and process critical minerals from legacy industrial waste to ensure bankability and cost competitiveness for commercial projects.
- Task relevant departments and agencies, in coordination with allied countries, to establish joint initiatives to develop and deploy advanced recycling and recovery technologies, strengthening shared supply chain resilience.
- Prioritize research into next-generation energy technologies that reduce reliance on scarce or geopolitically vulnerable critical minerals, including through targeted DOE innovation programs; expand research into material substitution technologies that enable replacement of high-risk critical minerals with more abundant or secure alternatives; and support pilot projects and commercialization pathways for unconventional sources of critical minerals, including extraction from brine, mine tailings, coal waste, and other secondary sources.
- Work with international partners to negotiate an international approach to recycling that is compliant with the *Basel Convention*.

## Policy Context:

DOE's Critical Materials Assessment identifies rare earth elements and other materials as important to clean energy technologies and exposed to supply risk.[354] Recycling, substitution, and recovery from secondary sources are a strategic hedge against import dependence, but they are not yet scaled enough to carry the supply chain on their own. USGS reported that only limited quantities of rare earths are currently recovered from batteries, permanent magnets, and fluorescent lamps.[355] DOE's Critical Materials Collaborative and related research programs are designed to build a longer-term research and development (R&D) roadmap for extraction, processing, recycling, and substitution, but deployment still requires capital, standards, and end-of-life collection systems.[356] A national battery and critical-mineral EPR framework, expanded recycling infrastructure, allied recycling initiatives, and DOE support for material substitution and unconventional sources will turn waste streams, mine tailings, brines, and end-of-life products into a resilience asset rather than a disposal liability.

Moreover, the United States exports our e-waste to other countries to process rather than keeping it at home and trying to recover the critical minerals to be reused. **THE BASEL ACTION NETWORK ESTIMATED THAT 10 COMPANIES EXPORTED MORE THAN 10,000 CONTAINERS OF E-WASTE VALUED OVER $1 BILLION TO COUNTRIES IN ASIA, INUNDATING COUNTRIES WITH WASTE THAT THEY DO NOT HAVE CAPACITY TO PROCESS SAFELY.**[357] Not only are we losing out on revenue and access to these critical minerals, but we are also burdening partners across the world with these used electronics. Given much of this waste ends up in China, we are further enabling our competitor to dominate this sector.[358] The U.S. must pursue recycling and reuse for products that are already in the United States and for which the minerals in them could have a second, third, or even fourth life.[359] If we produce components to power chips, hospitals, phones, and cars that contain less critical mineral material, we become less reliant on these very supply chains that constrain us.

The U.S. must pursue recycling and reuse for products that are already in the United States and for which the minerals in them could have a second, third, or even fourth life.




Source: Parker, E. (2025, October). *From Scrap to Supply: Circular Strategies for Critical Minerals*. Environmental and Energy Study Institute

[354] United States Department of Energy. (2023, May). *Critical Materials Assessment*. https://www.energy.gov/sites/default/files/2023-05/2023-critical-materials-assessment.pdf.

[355] United States Department of Energy. (2023, May). *Critical Materials Assessment*. https://www.energy.gov/sites/default/files/2023-05/2023-critical-materials-assessment.pdf.

[356] United States Department of Energy, Critical Materials Collaborative. (2024). *Forming Connections Across the Critical Materials Innovation Ecosystem*. https://www.energy.gov/sites/default/files/2024-10/critical-materials-collaborative-overview-slides-2024.pdf.

[357] Ghosal, A. (2025, October). *Discarded electronics from U.S. causing 'e-waste tsunami' in Southeast Asia, watchdog says*. Public Broadcast Service. https://www.pbs.org/newshour/world/discarded-electronics-from-u-s-causing-e-waste-tsunami-in-southeast-asia-watchdog-says.

[358] Crebo-Rediker, H. & Khan, M. (2026, February). *Leapfrogging China's Critical Minerals Dominance*. Council on Foreign Relations. https://www.cfr.org/reports/leapfrogging-chinas-critical-minerals-dominance?utm_source=chatgpt.com.

[359] Parker, E. (2025, October). *From Scrap to Supply: Circular Strategies for Critical Minerals*. Environmental and Energy Study Institute. https://www.eesi.org/articles/view/from-scrap-to-supply-circular-strategies-for-critical-minerals.

**Challenge – High U.S. standards that are more expensive to comply with than competitors' lower standards:** U.S. mining companies struggle to access foreign markets while competing with Chinese counterparts, in part because high U.S. standards are more expensive to comply with than competitors' lower standards. Critical mineral supply chains and markets are distorted because of the high concentration of Chinese producers, limiting commercial viability for other market entrants. U.S. competitors such as China do not prioritize maintaining high standards across the globe for human rights, environmental protection, and governance. Because of this, critical minerals extraction and processing funded by competitors can be cheaper than U.S. alternatives. The United States must remain the partner of choice despite this difference.

## Policy Options:

- Permanently authorize the Forum on Resource Geostrategic Engagement (FORGE), previously the Minerals Security Partnership (MSP). Through this program, convene countries and relevant nongovernmental stakeholders at the ministerial level to set and affirm investment priorities, discuss key gaps, and identify new challenges and opportunities for the group to pursue.
- Review all U.S.-led and allied international infrastructure and investment initiatives and maintain and expand participation in initiatives deemed critical to U.S. energy security, including the G7 Partnership for Global Infrastructure and Investment (PGII), to provide high-standard alternatives to lower-standard financing models. Identify and bolster funding for non-energy foreign assistance resources that can be directed to priority countries to provide wraparound services to communities hosting resource extraction projects.
- Strengthen engagement with transparency and governance initiatives, including rejoining these initiatives as appropriate, to promote responsible resource development globally. Such initiatives include the Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development (IGF); Global Battery Alliance (GBA); Responsible Minerals Initiative (RMI); Extractive Industries Transparency Initiative (EITI); and Organisation for Economic Co-operation and Development (OECD) Blue Dot Network. Provide funding to support these initiatives when possible..
- Require that all U.S. government-funded overseas investments comply with International Finance Corporation (IFC) Performance Standards, ensuring strong environmental, labor, and human rights protections across supply chains.
- Strengthen U.S. engagement with relevant initiatives of the World Bank and International Monetary Fund (IMF) to scale strategic investment in energy and critical minerals supply chains.

## Policy Context:

High-standard critical mineral development is central to making the United States and its allies the partner of choice. **THE U.S. GOVERNMENT ACCOUNTABILITY OFFICE (GAO) REPORTED THAT THE PRC PROVIDED ROUGHLY $679 BILLION FOR INFRASTRUCTURE PROJECTS GLOBALLY FROM 2013 THROUGH 2021, COMPARED WITH ROUGHLY $76 BILLION PROVIDED BY THE UNITED STATES ACROSS THE SAME SECTORS, UNDERSCORING THE SCALE OF STRATEGIC COMPETITION IN OVERSEAS INFRASTRUCTURE FINANCE.**[360]

The PRC does not value high environmental, social, and governance standards within their borders and in the countries where they are deeply entrenched. For example, in the Democratic Republic of the Congo (DRC), a country rich with the critical mineral cobalt, there is rampant child slave labor, militias control areas surrounding key mines, and the environment is contaminated.[361] These mines controlled in the DRC by Chinese state-owned enterprises such as the CMOC Group Limited, formerly China Molybdenum, are not transparent, do not have high labor or environmental standards, and are physically dangerous for anyone who comes near them.[362] U.S.-backed mining companies must prioritize high standards that do not exploit the communities or the environment where mines are located. U.S. engagement that upholds strong international standards can ensure the United States remains the partner of choice, through job creation and targeted development programs that advance education, public health, food security, and strong environmental standards. Rather than compete with the PRC and their dirty tactics, the United States, through expansion of our critical minerals supply chains, must uphold these standards at home and abroad.

One way to do this is by leveraging the U.S. voting power, shareholding, and leadership positions at the World Bank and IMF to galvanize and expand platforms that reduce investment risk and create additional fiscal space for trusted partners developing critical mineral and clean energy industries. These initiatives should fit into a broader U.S.-led model for international finance and distinguish themselves from exploitative, coercive finance arrangements by including high standards for transparency, environmental stewardship, and localized economic benefits.

[360] United States Government Accountability Office. (2024, September). *International Infrastructure Projects: China's Investments Significantly Outpace the U.S., and Experts Suggest Potential Improvements to the U.S. Approach*, GAO-24-106866. https://www.gao.gov/products/gao-24-106866.

[361] Kara, S. (2023, February). *The dangers of cobalt mining in the Congo*. Harvard T.H. Chan School of Public Health. https://hsph.harvard.edu/news/the-dangers-of-cobalt-mining-in-the-congo/.

[362] Congressional-Executive Commission on China. (2023, November). *From Cobalt to Cars: How China Exploits Child and Forced Labor in DR Congo*. https://www.congress.gov/event/118th-congress/joint-event/LC72512/text.

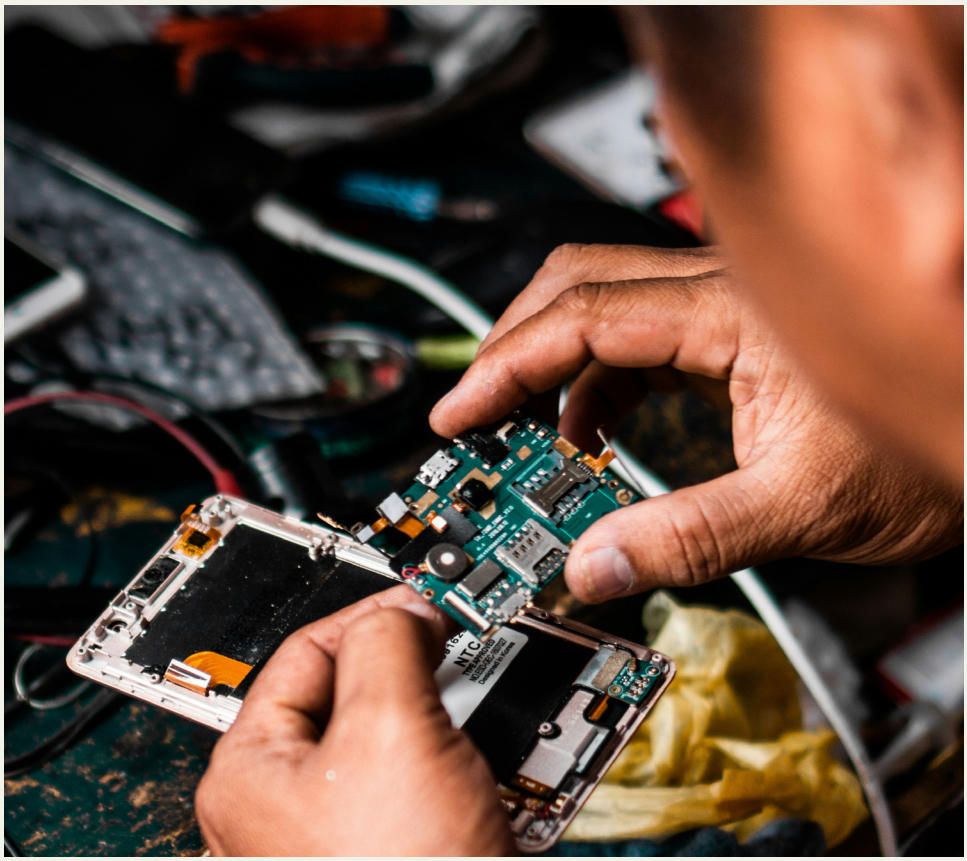
BENCHMARK #7.2:

# Workers across the country can access and secure jobs in energy-related sectors, and scientific experts have the resources to drive innovation.



**A STRONG ENERGY WORKFORCE AND ROBUST SCIENTIFIC ENTERPRISE ARE ESSENTIAL TO MAINTAINING U.S. LEADERSHIP IN INNOVATION AND ECONOMIC GROWTH.** Ensuring that workers, researchers, and institutions have access to opportunities and resources will help support the development and deployment of next-generation energy technologies. This section provides policy options for two key challenges:

1. Disconnected workforce development and industrial strategies
2. Limited U.S. investment in critical minerals technical expertise



Challenge – Disconnected workforce development and industrial strategies: While the advanced manufacturing landscape is constantly changing, the need for a specialized workforce is not. **THERE IS GROWING DEMAND FOR THE MINING, REFINING, PROCESSING, WELDING, BLACKSMITHING, AND RECYCLING SECTORS, BUT WORKFORCE SHORTAGES WILL INCREASINGLY CONSTRAIN THE ABILITY OF THE UNITED STATES TO ATTRACT AND SCALE STRATEGIC ENERGY INVESTMENTS. WORKFORCE DEVELOPMENT SYSTEMS ARE OFTEN DISCONNECTED FROM BROADER INDUSTRIAL STRATEGY AND INVESTMENT ATTRACTION EFFORTS, RESULTING IN GEOGRAPHICAL AND EDUCATIONAL GAPS BETWEEN WHERE PROJECTS ARE BEING DEVELOPED AND WHERE SKILLED WORKERS ARE BEING TRAINED.**

## Policy Options:

- Develop centers of excellence for clean energy, grid, and battery manufacturing skills.
- Direct DOE and the U.S. Department of Labor (DOL) to maintain a national workforce strategy identifying priority occupations necessary to meet stated energy security goals and align workforce investments accordingly. The strategy should highlight critical areas where more workforce training is necessary, particularly training that does not require a four-year degree, and identify U.S. public institutions where this training is available.
- Establish a memorandum of understanding (MOU) between DOE, the U.S. Department of the Interior (DOI), and the U.S. Department of Veterans Affairs (VA) to provide non-competitive eligibility for veterans to access jobs critical to U.S. national security. Ensure the GI bill and programs such as the Transition Assistance Program (TAP) support veterans' awareness and access to these jobs, including through reduced cost or free technical training, in order to update any educational requirements necessary to be eligible for these technical jobs.
- Direct DOL's Employment and Training Administration (ETA) to coordinate workforce planning efforts with the International Trade Administration (ITA), the Economic Development Administration (EDA), SelectUSA, and regional economic development organizations to ensure apprenticeship programs and workforce development investments are aligned with strategic energy and industrial investment priorities, including critical minerals, advanced manufacturing, and grid modernization.
- Support university and community college efforts to scale their energy sector training curriculum, with a particular focus on energy systems and critical minerals processing, refining, and recycling. In order to access funding, universities must certify they will employ the cyber-informed engineering method as outlined in the *DOE National Cyber-Informed Engineering Strategy of 2022*.
- Expand workforce development programs, including hands-on training for the next generation of construction workers and the Training for Residential Energy Contractors (TREC) program.

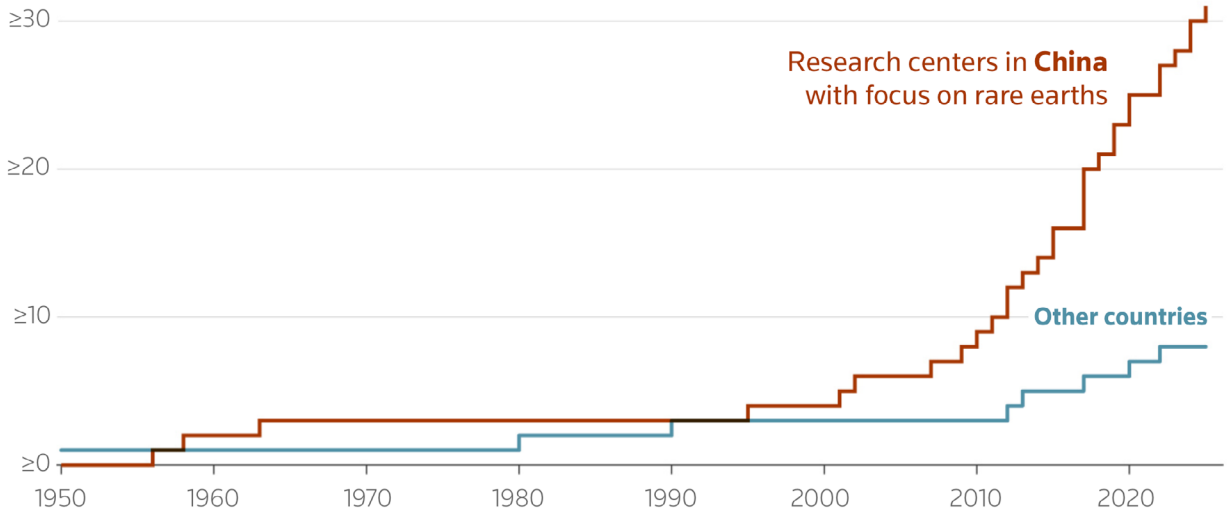
## Policy Context:

Increasing energy demand and the transition to clean energy technologies are creating new opportunities in construction, manufacturing, grid modernization, efficiency, mining, processing, and recycling. DOE's 2024 *U.S. Energy and Employment Report* tracks employment across energy technologies and found continued clean energy job growth.[363] These new technologies rely on robust access to critical minerals and their supply chains, but DOE's critical minerals workforce workshop report notes significant workforce needs in critical minerals and materials of national security interest, including the domestic battery materials supply chain.[364] Given the security and economic dual imperative for accessing these materials and developing advanced energy systems, the U.S. government must invest in a workforce that is capable of advancing our technological needs. This sector is ripe for new family-sustaining jobs and economic opportunity, but the federal government's efforts to grow this workforce must be strategic and intentional.



[363] United States Department of Energy. (2024). *United States Energy & Employment Report 2024*. https://www.energy.gov/sites/default/files/2024-08/2024%20USEER%20FINAL.pdf.

[364] Mehta, J. (2023, August). *Education and Workforce Development for Critical Minerals and Materials Supply Chains: Workshop Report*. United States Department of Energy. https://www.energy.gov/sites/default/files/2024-03/education-workforce-development-critical-minerals-materials-workshop-report.pdf.




Note: Tally is non exhaustive. Reuters identified 51 labs and institutesfocused on rare earths but could only establish the founding dates for 38 of them.

Source: Jackson, L., Scheyder, E., Mohammad Kawoosa, V., Fu, C., & Burton, M. (2026, May). *A bachelor's in rare earths? In China, there are schools for that*. Reuters.

**Challenge – Limited U.S. investment in critical minerals technical expertise:** While the United States seeks to become competitive with China in the critical minerals sector, China is outpacing the U.S. in investment in cultivating technical experts who know how to mine, process, and refine critical minerals and rare earth magnets.

## Policy Options:

- Identify U.S. vulnerabilities in the U.S. mining education system and related technical trainings, especially when compared with that in China, and make policy recommendations to close key gaps, including relevant updates to the National Security Strategy (NSS) and derivative documents.
- Create a specialized undergraduate and graduate student internship program across the DOE national laboratories, focused on the minerals sector. Identify options to create a complementary apprenticeship program for those receiving their education outside the traditional four-year university system.
- Create an international fellowship program for U.S. university-trained students to receive training and hands-on experience at peer institutions in partner countries with domestic mining capabilities to exchange best practices in the mining sector.
- Integrate minerals sector education into DOD's Professional Military Education (PME) framework. Ensure this education emphasizes the importance of maintaining high environmental standards.
- **SURGE FUNDING TO UNIVERSITIES AND COMMUNITY COLLEGES CO-LOCATED WITH U.S. MINERAL DEPOSITS TO STUDY RESPONSIBLE MINING TECHNIQUES THAT EMPHASIZE PROTECTING THE LOCAL ENVIRONMENT FROM EXPOSURE TO TOXIC SUBSTANCES FROM THE MINES.**
- Expand collaboration with mining experts in other countries, including creating new incentive programs for them to train and work in the United States.

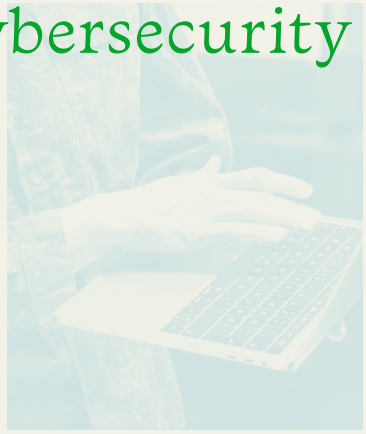
## Policy Context:

According to a May 2026 report from Reuters, "China has created an ecosystem of more than 40 specialist rare earth laboratories that produce cutting-edge research, supplemented by at least 11 universities and technical colleges that collectively enroll more than 500 students annually in rare earths degree programs."[365] In China, you can receive a bachelor's degree in rare earths, intern as an undergraduate at mines co-located with these specialized universities, attend lectures facilitated by industry and Chinese national labs, and have job prospects upon graduation in this field. Students learn about the importance of critical minerals to PRC geopolitical interests and are treated as a valued asset by the Chinese Communist Party. There is no parallel in the United States, meaning the U.S. lacks adequate technical and scientific expertise to be competitive in this highly technical sector. Yet, because the Chinese model does not prioritize teaching about environmental and labor protections, technical experts coming out of China lack key training necessary to support sustainable mining efforts. Any alterative in the United States must prioritize and integrate sustainability into mining practices.

[365] Source: Jackson, L., Scheyder, E., Mohammad Kawoosa, V., Fu, C., & Burton, M. (2026, May). *A bachelor's in rare earths? In China, there are schools for that*. Reuters. https://www.reuters.com/graphics/CHINA-RAREEARTHS/UNIVERSITIES/zgpolorrwvd/?utm_source=twitter&utm_medium=Social.

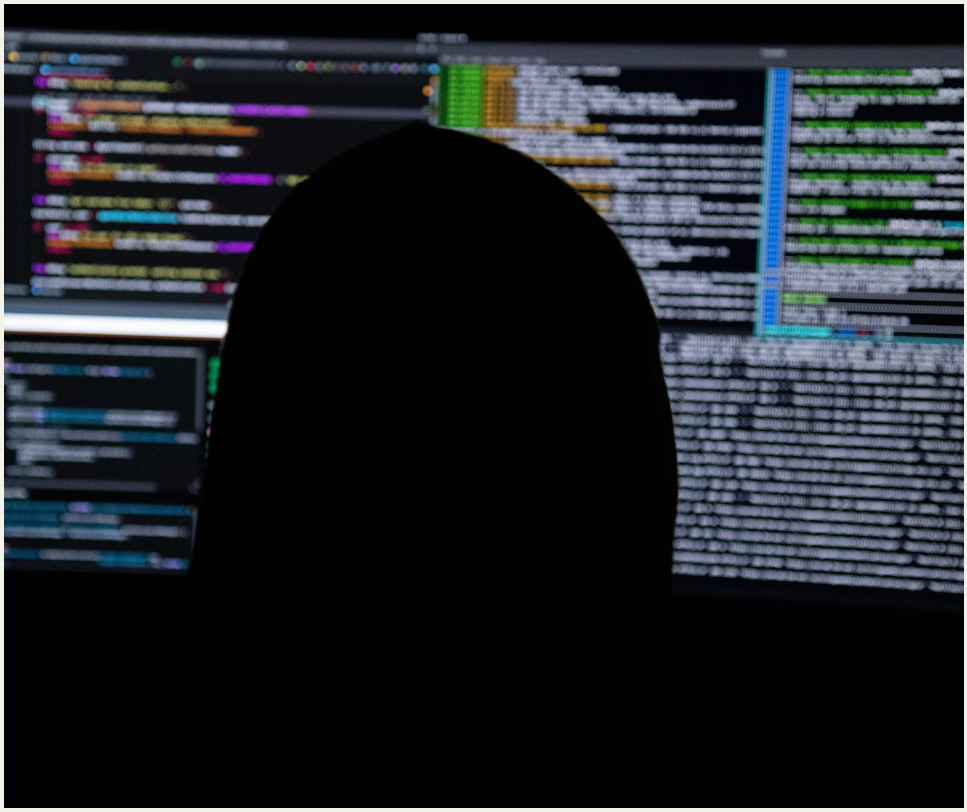
BENCHMARK #7.3:

# Energy infrastructure is secure and resilient, supported by robust cybersecurity capacity.



**RELIABLE CRITICAL INFRASTRUCTURE, PARTICULARLY ENERGY, UNDERPINS ECONOMIC ACTIVITY, PUBLIC SAFETY, AND NATIONAL SECURITY.** As energy systems become more interconnected and face growing physical and cyber risks, maintaining resilience requires both modern infrastructure and sustained scientific and technical expertise. This section provides policy options for four key challenges:

1. Improperly managed technology modernization that opens the door for cyber risks
2. Energy system cyber risks that threaten national and energy security
3. Limited coordination of cyber and energy domains
4. Climate-fueled natural disasters that threaten critical infrastructure, particularly energy, and national security



**Challenge – Improperly managed technology modernization that opens the door for cyber risks:** The deployment of artificial intelligence (AI) and new smart technologies will either harden U.S. critical infrastructure or introduce significant security gaps depending on how they are deployed. As more smart technology is integrated into critical infrastructure, adversaries will take advantage of the opportunity to gain information on, and access to, U.S. critical infrastructure. At the same time, improving the efficiency, resilience, and reliability of the nation's energy systems will require integrating many new digital technologies into existing infrastructure. These changes are essential not only for supporting the clean energy transition but also for strengthening resilience against increasing natural hazards such as wildfires, storms, flooding, and other climate-driven disruptions.

If implemented thoughtfully, a more digitally connected and diversified grid can ultimately be more cybersecure and resilient than the current grid. However, the growing integration of networked technologies also creates new opportunities for foreign adversaries and other malign actors to exploit vulnerabilities in critical infrastructure systems. The challenge, therefore, is not to avoid modernization but to ensure that scrutiny and risk management are targeted appropriately toward technologies and systems that pose meaningful cyber risks. Some technologies may present minimal direct cyber risk, while others such as highly networked distributed energy coordination platforms or virtual power plants (VPPs) may warrant significantly greater attention and safeguards.

## Policy Options:

- Re-operationalize the Cyberspace Solarium Commission (CSC) with a directive to focus on the energy-cyber nexus.
- Conduct a study to analyze the potential impact of quantum computing on U.S. energy security and develop a national strategy to prepare the energy sector for quantum-enabled cybersecurity threats.
- Set and enforce software and firmware upgrade requirements for use in security policies by all energy system operators, including behind-the-meter and distributed energy resources (DERs) that are not covered by North American Electric Reliability Corporation's Critical Infrastructure Protection (NERC-CIP) requirements. Direct the Cybersecurity and Infrastructure Security Agency (CISA) to maintain a database of commonly known vulnerabilities and required updates, and coordinate with DOD and the Federal Bureau of Investigation (FBI) to provide additional context as needed through classified communication channels.
- Mandate that energy utilities or producers that contract with the government conduct third-party auditing of cybersecurity systems for vulnerable components, including supervisory control and data acquisition (SCADA) systems and other digitally connected industrial control systems (ICS).
- Prohibit import and utilization of technology manufactured, developed, or affiliated with a foreign adversary entity that enables remote monitoring capabilities for critical infrastructure. Ensure critical technology does not utilize Light Detection and Ranging (LiDAR) technology and communication devices (e.g., routers, modems, switches) from adversaries.
- Require a phase out of PRC-controlled software and ensure U.S. data sovereignty in all critical infrastructure sectors that touch the energy system. Bolster R&D funding for the government to develop and commercialize alternatives not linked to adversaries.
- Incentivize friendshoring manufacturing for critical electric technologies, including power electronics, chips, battery and energy management systems, and inverters.
- Require Hardware Bill of Materials (HBOM) and Software Bill of Materials (SBOM) for government procured products and the right to third-party audit and inspection.
- Require energy system vulnerability assessments for installers and integrators to evaluate cyber risks, software and hardware vulnerabilities, and climate hazards.

## Policy Context:

The grid is becoming more digital, distributed, and interconnected at the same time adversaries are increasingly targeting U.S. critical infrastructure.[366] DOE's report on cybersecurity considerations for DERs warns that DER growth creates new cyber risks for the electric grid.[367] Additionally, **NERC ESTIMATES 60 NEW VULNERABLE POINTS ARE CREATED ON THE GRID EACH DAY.**[368] The integration of new smart systems with old systems creates seams that can be exploited by state and non-state actors, and there is no universal standard or regulation that governs U.S. critical infrastructure against these threats.[369] It can also create an opportunity to integrate new systems that have built-in protections against cyber threats and software that can be upgraded as threats are detected. The DOE Cyber Sense Program, created under the *Infrastructure Investment and Jobs Act* (IIJA), applies classified threat intelligence and expert testing to identify systemic vulnerabilities in energy sector systems, but this program remains limited and does not reflect a necessary whole-of-government approach to tackling cyber risks.[370]

[366] Joshi, A. (2026, May). *Cyberattacks target US infrastructure, and other cybersecurity news*. World Economic Forum. https://www.weforum.org/stories/2026/04/cyberattacks-target-us-infrastructure-cybersecurity-news/.

[367] United States Department of Energy. (2022, October). *DOE Cybersecurity Report Provides Recommendations to Secure Distributed Clean Energy on the Nation's Electricity Grid*. https://www.energy.gov/ceser/articles/doe-cybersecurity-report-provides-recommendations-secure-distributed-clean-energy.

[368] Kearney, L. (2024, April). *US electric grid growing more vulnerable to cyberattacks, regulator says*. Reuters. https://www.reuters.com/technology/cybersecurity/us-electric-grid-growing-more-vulnerable-cyberattacks-regulator-says-2024-04-04/.

[369] Krejsa, H. (2025, January). *SUN SHIELD: How Clean Tech & America's Energy Expansion Can Stop Chinese Cyber Threats*. Carnegie Mellon Institute for Strategy & Technology. https://www.cmu.edu/cmist/tech-and-policy/sun-shield/krejsa-jan2025.html.

[370] United States Department of Energy. (n.d). *Securing National Critical Energy Infrastructure and Supply Chain from Cyber Threats*. https://www.energy.gov/ceser/energy-cyber-sense-program.

**Challenge – Energy system cyber risks that threaten national and energy security:** Due to a lack of policy standardization and uniform oversight, the energy system writ large is exposed to cyberattacks, which threatens national and energy security.

## Policy Options:

- Convene relevant agencies, including the National Institute of Standards and Technologies (NIST), DOE, U.S. Department of Transportation (DOT), the FBI, DOD, and CISA to develop and implement a uniform federal cybersecurity standard consistent with industry best practices, including zero trust architecture for new smart energy technologies added to the existing grid. The standard should focus on the fusion of newer information technologies (IT) and older operational technologies to address critical seams in the protection of this integrated infrastructure. It may also consider recommending or requiring grid operators to integrate distributed energy resource management systems (DERMS).
- Convene relevant agencies, including NIST, DOE, DOT, the FBI, DOD, and CISA to develop and implement a uniform federal cybersecurity standard specifically for new IT energy systems like VPPs. Provide regular updates to energy system operators for required system upgrades to ensure software and firmware are up to date with maximum cyber protections.
- Coordinate with the North Atlantic Treaty Organization (NATO) and Member States to share best practices for maintaining the highest cyber protections and working across different software systems, particularly of critical and energy infrastructure.

## Policy Context:

Energy cybersecurity governance is fragmented across agencies, including the Federal Energy Regulatory Commission (FERC), NERC, DOE, CISA, the FBI, DOD, and the Office of the Director of National Intelligence (ODNI); state regulators; utilities; equipment vendors; and regional grid operators.[371] That fragmentation matters because DOE and GAO have both identified distribution-system and distributed-resource cybersecurity as growing risk areas, while existing mandatory reliability standards remain largely concentrated on the bulk power system.[372,373] As more DERs, smart grid technologies, electric vehicle (EV) charging infrastructure, and VPPs are connected to the grid, the opportunity for malign actors continues to expand, as do opportunities to better secure the grid.[374] DOE has warned that many emerging energy technologies were not originally designed with cybersecurity as a primary consideration, creating vulnerabilities that can be exploited as these systems scale.[375]

A key challenge is the growing convergence of IT systems and operational technology (OT) systems. Historically, energy infrastructure relied on relatively isolated operational systems, but modern grid operations increasingly depend on digitally connected technologies that exchange data across utilities, customers, third-party service providers, and grid operators. As highlighted in a January 2025 *Sun Shield* report, these connections improve efficiency and reliability but also create new seams that adversaries can exploit.[376] Developing uniform federal cybersecurity standards for emerging energy technologies and digital grid systems can help close these gaps by establishing consistent security requirements, improving interoperability across jurisdictions, reducing uncertainty for manufacturers and operators, and ensuring that cybersecurity protections keep pace with the rapid deployment of new energy technologies.[377]



[371] United States Government Accountability Office. (2023, August). *Electricity Grid: DOE Could Better Support Industry Efforts to Ensure Adequate Transformer Reserves*, GAO-23-106180. https://www.gao.gov/products/gao-23-106180.

[372] United States Department of Energy. (2022, October). *Cybersecurity Considerations for Distributed Energy Resources on the U.S. Electric Grid*. https://www.energy.gov/sites/default/files/2022-10/Cybersecurity%20Considerations%20for%20Distributed%20Energy%20Resources%20on%20the%20U.S.%20Electric%20Grid.pdf.

[373] United States Government Accountability Office. (2023, August). *Electricity Grid: DOE Could Better Support Industry Efforts to Ensure Adequate Transformer Reserves*, GAO-23-106180. https://www.gao.gov/products/gao-23-106180.

[374] Benich, P., Stewart, E., & Krejsa, H. (2026, May). *ELECTROTECH MONEYBALL: An Industrial Strategy for Ranking Risk and Opportunity in Energy & AI Supply Chains*. Carnegie Mellon Institute for Strategy & Technology. https://www.cmu.edu/cmist/tech-and-policy/electrotech-moneyball/index.html.

[375] United States Department of Energy. (2022, June). *National Cyber-Informed Engineering Strategy*. https://www.energy.gov/ceser/national-cyber-informed-engineering-strategy.

[376] Krejsa, H. (2025, January). *SUN SHIELD: How Clean Tech & America's Energy Expansion Can Stop Chinese Cyber Threats*. Carnegie Mellon Institute for Strategy & Technology. https://www.cmu.edu/cmist/tech-and-policy/sun-shield/krejsa-jan2025.html.

[377] Krejsa, H. (2025, January). *SUN SHIELD: How Clean Tech & America's Energy Expansion Can Stop Chinese Cyber Threats*. Carnegie Mellon Institute for Strategy & Technology. https://www.cmu.edu/cmist/tech-and-policy/sun-shield/krejsa-jan2025.html.

**Challenge – Limited coordination of cyber and energy domains:** A lack of coordination among the agencies and between regional grid operators leads to patchwork implementation and enforcement of critical cybersecurity standards in our energy system, which creates critical vulnerabilities that implicate national security.

## Policy Options:

- **CREATE AN ASSISTANT NATIONAL CYBER DIRECTOR (ANCD) FOR ENERGY WITHIN THE WHITE HOUSE ONCD, WHOSE SOLE PURPOSE IS TO COORDINATE BETWEEN THE U.S. GOVERNMENT'S CYBERSECURITY AND ENERGY AGENCIES, DEPARTMENTS, AND OFFICES.** Within the ANCD for Energy purview, there should be at least one private sector liaison who regularly convenes the private sector to understand emerging challenges and threats in real time. Among other responsibilities, this role should focus on the integration of newer clean energy market entrants that may not be connected to pre-existing intelligence sharing infrastructure and should include clear outcome-oriented performance measures.[378]
- Identify categories of technologies and components that pose a cybersecurity risk and develop a database of certified products where the risks have been mitigated per U.S. government standards.
- Authorize and provide regular appropriations for DOE's Office of Cybersecurity, Energy Security, and Emergency Response (CESER) and direct CESER to regularly coordinate with relevant interagency partners, including CISA, ODNI, the FBI, and DOD.
- Revitalize the Alliance of National Councils for Homeland Operational Resilience (ANCHOR) cross-sector working groups to include energy security as part of its mandate.
- Ensure regular interagency coordination with the Electricity Subsector Coordinating Council (ESCC), Energy Threat Analysis Center (ETAC), and Electricity Information Sharing and Analysis Center (E-ISAC).
- Improve intelligence sharing mechanisms between the United States government and relevant private sector companies and industry groups intended to provide real-time risk updates that aggregate threat information, gathered from all relevant agencies, related to privately-owned and operated energy infrastructure. Focus on whether smaller operators are able to access the same amount and quality of information as larger, institutional operators.
- Create a 911-type system or switchboard for cyberattacks to serve as a one-stop shop that private grid operators can call to report suspected cyberattacks and request U.S. government support to mitigate such attacks. This system could serve as a streamlined way to aggregate mandatory reports of cyberattacks as required by pre-existing law and regulations and could be integrated into the communications network mandated by the Congressional 9/11 Commission.

## Policy Context:

**THE UNITED STATES GRID IS ONE OF THE MOST COMPLEX AND INTERCONNECTED SYSTEMS IN THE WORLD.** Serving over 330 million people, encompassing more than 7,300 power plants, and spanning over 600,000 miles of high-voltage transmission lines,[379] the energy system is a critical driver of the U.S. economy and is the bedrock powering U.S. critical infrastructure.[380] Despite how essential our energy system is to U.S. national security and economic well-being, the distinct networks that make up the grid are individually managed by regional private sector entities, which creates challenges implementing and enforcing central cybersecurity protections, leading to significant gaps in protection across the U.S. energy system.[381]

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[378] United States Government Accountability Office. (2023, September). *Critical Infrastructure Protection: National Cybersecurity Strategy Needs to Address Information Sharing Performance Measures and Methods*, GAO-23-105468. https://www.gao.gov/products/gao-23-105468.

[379] Abrahams, L. & Williams, L. (2026, April). *Iran Conflict Heightens Cyber Threats to U.S. Energy Infrastructure*. Center for Strategic and International Studies. https://www.csis.org/analysis/iran-conflict-heightens-cyber-threats-us-energy-infrastructure.

[380] Cybersecurity and Infrastructure Security Agency. (n.d.). *Critical Infrastructure Sectors*. https://www.cisa.gov/topics/critical-infrastructure-security-and-resilience/critical-infrastructure-sectors.

[381] For further discussion of energy grids, see Chapter 4: Cheap, Abundant, and Clean American Energy for All.

**Challenge – Climate-fueled natural disasters that threaten critical infrastructure, particularly energy, and national security:** Climate-fueled disasters like wildfires and extreme temperatures are increasingly disrupting energy systems and cascading into national security risks due to grid outages, supply chain disruptions, and strains on emergency response systems. Related elective public safety power shutoffs from grid operators to mitigate wildfire risks harms individuals and businesses, particularly in the American West, impacting their critical systems such as healthcare and business operations. Moreover, wildfires and other disasters expose gaps in coordination between land management, utilities, and energy system operators, increasing the likelihood of infrastructure failure and cascading impacts.

## Policy Options:

- Expand funding through DOE and the Federal Emergency Management Agency (FEMA) for grid-edge resilience investments, including microgrids, DERs, smart thermostats, islanding capabilities for critical infrastructure (e.g., hospitals, emergency response centers, water systems), and military critical infrastructure in wildfire- and disaster-prone regions.
- Establish regional Energy-Wildland Risk Coordination Centers to align land management, utility operations, and grid resilience planning through regular meetings and planning centers. These centers facilitate real-time coordination on vegetation management, controlled burns, and infrastructure protection strategies. Increase the Bureau of Land Management (BLM) and the U.S. Forest Service's (USFS) staffing capacity, including to support these centers.
- Create a pilot program to explore adoption of advanced monitoring and early detection technologies, including AI-enabled wildfire detection, grid sensors, and satellite monitoring, with cost recovery mechanisms approved by regulators where investments demonstrably reduce systemic risk. All advanced monitoring and early detection technologies should be compliant and up to date with the highest-level cyber protection standards.
- Increase integrated National Guard, state, and local disaster response units, similar to California's Task Force Rattlesnake between the National Guard and the California Department of Forestry and Fire Protection (CalFIRE).
- Incorporate wildfire risk into to Defense Critical Electric Infrastructure (DCEI).

## Policy Context:

Increasingly severe wildfires demonstrate that fire is no longer solely a land management or environmental challenge – it is an energy security and national security challenge. In 2024, more than 64,000 wildfires burned nearly 9 million acres across the United States.[382] The January 2025 Los Angeles wildfires alone burned more than 50,000 acres, destroyed over 16,000 structures, and caused an estimated $250 billion in economic losses, making them among the costliest disasters in U.S. history.[383] The fires disrupted electricity infrastructure, communications systems, transportation networks, schools, healthcare facilities, and business operations across one of the nation's largest metropolitan regions.

Wildfires create cascading failures across interconnected systems.[384] In the American West, utilities have increasingly relied on public safety power shutoffs to reduce ignition risks during extreme fire weather. While these shutoffs can prevent catastrophic fires, they can also interrupt healthcare delivery, manufacturing operations, emergency communications, water systems, and other critical services that depend on reliable electricity. At the same time, responsibility for wildfire mitigation and energy resilience remains fragmented across utilities, federal land managers, emergency managers, and state regulators. These policy options will provide stronger coordination and integrated planning to combat the wildfire risks that will continue to threaten critical infrastructure, particularly energy, strain emergency response resources, and expose vulnerabilities across the systems that underpin economic and national security.[385]

[382] National Interagency Coordination Center. (2024). *Wildland Fire Summary and Statistics Annual Report*. https://www.nifc.gov/sites/default/files/NICC/2-Predictive%20Services/Intelligence/Annual%20Reports/2024/annual_report_2024.pdf.

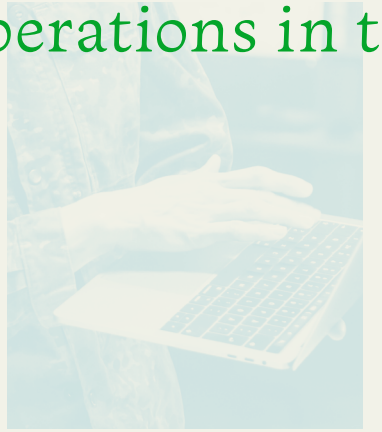
[383] A Rafferty, J. (2026, July). *Los Angeles wildfires of 2025*. Britannica. https://www.britannica.com/event/Los-Angeles-wildfires-of-2025.

[384] Ellison, T. & Greensfelder, J. (2025, January). *Devastating Los Angeles Wildfires Highlight National Security Risks Too*. Council on Strategic Risks. https://councilonstrategicrisks.org/2025/01/16/devastating-los-angeles-wildfires-highlight-national-security-risks-too/.

[385] For additional solutions related to wildfire and disaster resilience, see Chapter 3: Thriving, Affordable, Resilient Communities and Chapter 5: Cheap, Abundant, and Clean American Energy for All.

BENCHMARK #7.4:

# Investors and industry stakeholders actively invest in and expand clean energy operations in the United States.



**PRIVATE-SECTOR INVESTMENT PLAYS AN ESSENTIAL ROLE IN BUILDING CRITICAL INFRASTRUCTURE, PARTICULARLY ENERGY INFRASTRUCTURE, SCALING NEW TECHNOLOGIES, AND STRENGTHENING DOMESTIC INDUSTRIES.** Stable market conditions, supportive policy environments, and long-term confidence in U.S. competitiveness are important factors in attracting and retaining investment. This section provides policy options for three key challenges:

1. No clear strategy across domestic industrial policy, export promotion, and foreign investment attraction
2. Unclear alignment of critical energy sector investments and U.S. national security objectives
3. U.S. failure to account for carbon intensity, undermining our competitive advantage and increasing costs for consumers



Challenge – No clear strategy across domestic industrial policy, export promotion, and foreign investment attraction: **THE UNITED STATES LACKS A COHERENT STRATEGY THAT LINKS DOMESTIC INDUSTRIAL POLICY WITH EXPORT PROMOTION AND FOREIGN INVESTMENT ATTRACTION. PRIVATE SECTOR PARTNERS LACK A CLEAR FEDERAL ENTRY POINT WHEN THEY WANT TO ENGAGE WITH THE U.S. GOVERNMENT TO MAKE ENERGY INVESTMENTS AND HAVE A HARD TIME UNDERSTANDING FEDERAL REGULATORY REGIMES, IMPACTING POTENTIAL INVESTMENT. EXISTING FEDERAL TOOLS FOR INVESTMENT PROMOTION, EXPORT ASSISTANCE, WORKFORCE COORDINATION, AND INDUSTRIAL POLICY ARE OFTEN SILOED, INCONSISTENTLY IMPLEMENTED ACROSS AGENCIES AND REGIONS, AND INSUFFICIENTLY ALIGNED WITH BROADER U.S. NATIONAL SECURITY AND ECONOMIC COMPETITIVENESS OBJECTIVES.**

Historically, export promotion policy has focused narrowly on helping U.S. firms sell products abroad, while domestic industrial strategy has operated separately. In practice, however, the success of U.S. manufacturing and advanced energy industries depends on both strong domestic demand and sustained access to foreign markets. The same supply chains, financing structures, standards-setting bodies, and commercial relationships that shape U.S. competitiveness at home also determine whether American firms can compete internationally.

This fragmentation makes it difficult for investors, foreign governments, and U.S. companies to identify clear federal counterparts, access financing tools, navigate regulatory requirements, and coordinate workforce and infrastructure development. The absence of a centralized federal investment coordination structure also leaves state and regional economic development organizations, which are often the front line of investment attraction, without consistent federal support.

## Policy Options:

- Direct the U.S. Department of Commerce, DOE, the U.S. Environmental Protection Agency (EPA), and other relevant interagency partners to create a private sector advisory group to advise on practical private sector solutions to advance emissions reduction targets during the intersessional periods between Nationally Determined Contribution (NDC) submissions. This will then inform new targets as the NDC is updated and ensure the most recent or subsequent U.S. NDC is practical and implementable.[386]
- To ensure the most recent or subsequent U.S. NDC is investible, develop an action plan for the private sector to invest in technologies to advance emissions reduction targets identified in successive NDC submissions.
- Strengthen and expand the U.S. Commercial Service and U.S. Export Assistance Centers (USEACs) by increasing staffing capacity, improving interagency coordination, and standardizing engagement with state and regional economic development organizations to provide more consistent support for domestic and international investors to invest in clean energy.
- Establish a focal point within the Department of Commerce to serve as a centralized federal liaison for domestic and foreign investors seeking to develop clean energy projects in the United States.
- Reform and modernize the Trade Promotion Coordinating Committee (TPCC) to align export promotion, inward investment attraction, and industrial policy objectives and to coordinate trade, investment, workforce, standards, and supply chain strategies related to advanced clean energy industries and critical minerals.
- **DEVELOP A NATIONAL COUNTRY COMMERCIAL GUIDE FOR THE UNITED STATES, LED BY THE ITA, SELECTUSA, AND STATE ECONOMIC DEVELOPMENT PARTNERS, THAT IDENTIFIES STRATEGIC U.S. CLEAN ENERGY, MANUFACTURING, GRID, AND CRITICAL MINERALS PROJECTS AVAILABLE FOR DOMESTIC AND INTERNATIONAL INVESTMENT. THE GUIDE SHOULD INCLUDE INFORMATION ON WORKFORCE AVAILABILITY, REGIONAL INFRASTRUCTURE ASSETS, FINANCING OPPORTUNITIES, AND PERMITTING PATHWAYS TO PROVIDE INVESTORS WITH A CLEAR UNDERSTANDING OF INVESTMENT OPPORTUNITIES IN THE UNITED STATES.**
- Expand support for Manufacturing Extension Partnership (MEP) Centers to assist small- and medium-sized manufacturers in becoming qualified suppliers for domestic and foreign original equipment manufacturers (OEMs) in clean energy and advanced manufacturing sectors.
- Provide additional funding to the U.S. Trade and Development Agency (USTDA) to advance U.S. leadership in global standards development for clean energy technologies, grid systems, and critical infrastructure. Increased funding should support feasibility studies, pilot projects, technical assistance, and deployment planning conducted by U.S. firms and technical experts in emerging markets. These initiatives will strengthen adoption of high-standard U.S.-aligned technologies and reduce the risk that adversarial countries dominate the technical standards governing future energy systems.
- Integrate ITA specialists directly into EXIM programs and project teams to improve coordination between export promotion and export financing efforts, particularly for advanced clean energy technologies and critical mineral and material supply chains.

[386] Under the Paris Agreement, Parties must prepare, communicate, and maintain successive national climate plans (known as "Nationally Determined Contributions'" or NDCs) outlining domestic mitigation measures the country intends to pursue, with the aim of achieving the objectives of such contributions. While the United States is no longer Party to the Paris Agreement, the previous administration submitted an updated NDC in 2024 that can serve as the current U.S. roadmap.

- Expand the role of SelectUSA beyond investment attraction to include stronger coordination with domestic industrial policy, regional workforce development initiatives, and state economic development organizations. SelectUSA should work closely with EDA, MEP, and state and local partners to ensure that federal investment promotion efforts are aligned with regional manufacturing and infrastructure strategies.
- Expand the mission of the Investment Advisory Council (IAC) to focus specifically on energy security, clean energy development and deployment, industrial competitiveness, strategic supply chains, and advanced manufacturing investment attraction. The Council should include representatives from industry, labor, finance, state economic development organizations, and national security stakeholders.

## Policy Context:

Private investment is necessary to build energy and critical mineral supply chains at scale, but companies often face a fragmented federal interface when evaluating overseas projects, export opportunities, or public finance tools. Competitor countries frequently integrate commercial diplomacy, export financing, infrastructure development, and standards promotion into unified overseas engagement strategies. The United States often approaches these functions separately, limiting the effectiveness of U.S. economic statecraft and reducing the ability of American firms to compete in strategically important markets. GAO found that the PRC's global infrastructure finance has far exceeded U.S. finance in recent years,[387] weakening the U.S.' hand in the strategic competition.[388] At the same time, the IEA's *World Energy Investment 2025* report emphasizes that emerging and developing economies need international public finance to be used strategically to mobilize larger volumes of private capital.[389]

**THE CURRENT U.S. APPROACH TO TRADE, INVESTMENT ATTRACTION, INDUSTRIAL STRATEGY, AND EXPORT PROMOTION REMAINS LARGELY STRUCTURED AROUND ASSUMPTIONS FROM THE 1980S AND 1990S, WHEN THE UNITED STATES WAS PRIMARILY FOCUSED ON EXPANDING EXPORTS INTO RAPIDLY GLOBALIZING MARKETS. TODAY'S ENERGY ECONOMY IS FUNDAMENTALLY DIFFERENT.** Strategic competition increasingly centers on supply chain positioning, standards setting, domestic manufacturing capacity, access to critical minerals, and long-term infrastructure finance. U.S. firms need support not only exporting finished products overseas but also integrating into global manufacturing supply chains, securing reliable suppliers, and competing in markets where foreign governments heavily shape industrial outcomes. Establishing a focal point, or concierge, within the Department of Commerce can help coordinate across agencies (including where permitting support is necessary and outside the scope of the Department of Commerce), identify barriers to investment, support engagement with state and local economic development organizations, and elevate systemic issues requiring interagency resolution.

Standards development is especially important in emerging energy technologies and electro-technical systems. Countries that dominate technical standards often shape future global markets and create structural advantages for their domestic firms. If adversarial competitors dominate standards-setting bodies and technology deployment ecosystems, U.S. exports may face long-term market access constraints regardless of technological quality or innovation.

Federal investment promotion and export assistance programs also vary significantly in effectiveness and coordination across regions. State and local economic development organizations often serve as the operational leaders for attracting investment, workforce planning, and industrial development, but federal engagement with these entities remains inconsistent. A stronger federal-state coordination framework will improve project development, reduce duplication, and help ensure federal industrial policy investments translate into durable regional economic growth.

The United States must also better align domestic industrial policy with international economic engagement. Advanced energy manufacturing competitiveness depends not only on domestic production incentives but also on sustained foreign demand, access to overseas markets, secure supplier networks, and international financing mechanisms that support U.S. technologies abroad. Strategic use of public financing, standards promotion, export assistance, and diplomatic engagement can help create long-term global demand for U.S. products while strengthening domestic manufacturing and energy security.

[387] United States Government Accountability Office. (2024, September). *International Infrastructure Projects: China's Investments Significantly Outpace the U.S., and Experts Suggest Potential Improvements to the U.S. Approach*, GAO-24-106866. https://www.gao.gov/products/gao-24-106866.

[388] Pyatt, G. (2023, June). *Assessing U.S. Efforts to Counter China's Coercive Belt and Road Diplomacy*. House Foreign Affairs Committee. https://docs.house.gov/meetings/FA/FA00/20230614/116025/HHRG-118-FA00-Wstate-PyattG-20230614.pdf.

[389] International Energy Agency. (2025, June). *World Energy Investment 2025*. https://www.iea.org/reports/world-energy-investment-2025.

**Challenge – Unclear alignment of critical energy sector investments and U.S. national security objectives:** U.S. industry actors looking to invest in critical energy sectors are not inherently aligned with U.S. national security objectives. Moreover, the United States lacks a coherent framework for evaluating and deploying trade restrictions, export controls, and investment restrictions to strengthen domestic clean energy competitiveness, protect critical infrastructure, and reduce strategic dependencies on adversarial nations.

## Policy Options:

- Bolster political risk insurance and create tax incentives to align U.S. private sector international engagement with U.S. national security interests.
- Conduct a comprehensive review of existing trade and investment authorities, including Sections 232 (of the *Trade Expansion Act of 1962*) and 301 (of the *Trade Act of 1974*), Information and Communications Technology and Services (ICTS) authorities, Committee on Foreign Investment in the United States (CFIUS) authorities, and DPA authorities to assess their applicability to strategic clean energy technologies and supply chains. As necessary, modernize these existing authorities to address strategic clean energy technologies and supply chains.
- Direct the Office of Science and Technology Policy (OSTP) and the National Science and Technology Council (NSTC) to update and expand the U.S. Critical and Emerging Technologies List to identify energy technologies, manufacturing inputs, software, and industrial processes that are critical to U.S. economic competitiveness, energy security, and national security.
- Utilize existing DPA authorities to conduct recurring industrial base assessments for strategic clean energy technologies and supply chains, including solar components, transformers, grain-oriented electrical steel, power electronics, battery materials, rare earth magnets, and other technologies identified through the Critical and Emerging Technologies review.
- Establish a publicly available interagency framework for evaluating when export controls, import restrictions, and investment screening strengthen U.S. energy security competitiveness. With support from DOD, conduct tabletop exercises to examine potential responses if the U.S. were to implement one of these policies and publish an unclassified summary of fundings.
- Establish a formal interagency review process to evaluate foreign participation in U.S. energy infrastructure and critical energy technology supply chains using existing ICTS, CFIUS, and sector-specific authorities where appropriate. This is in addition to focusing on foreign participation in the companies themselves as CFIUS does. This could be modeled after the Team Telecom structure where Team Telecom reviews foreign participation in the physical infrastructure.
- Expand coordination with allies and partners on strategic clean energy supply chains, including export control coordination, supplier diversification initiatives, and voluntary arrangements focused on technologies critical to energy security and industrial competitiveness.

## Policy Context:

Private companies make decisions based on profit potential and their bottom line. Profit considerations are not always aligned with U.S. national security needs, leading to a mismatch between the need for private sector investment in the energy sector and investment availability. Trade restrictions have increasingly become a tool of industrial strategy and national security policy that can direct the private sector toward more nationally strategic investments. Over the past decade, the United States has used authorities such as Section 301 tariffs, Section 232 investigations, ICTS restrictions, export controls, and investment screening mechanisms to address concerns ranging from unfair trade practices to critical infrastructure security. Many of these authorities were developed for telecommunications, semiconductors, and defense technologies, but similar questions are increasingly emerging across clean energy supply chains as they use similar components to key critical infrastructure sectors. For example, the United States has imposed tariffs on solar imports linked to unfair trade practices, restricted certain foreign participation in connected technologies through ICTS authorities, and launched investigations into imports that may affect domestic industrial capacity and national security.[390]

At the same time, the United States lacks a systematic process for determining when trade restrictions improve competitiveness and resilience versus when they increase costs, constrain innovation, or create new dependencies in this sector. As strategic competition increasingly extends into batteries, solar manufacturing, power electronics, critical minerals, grid equipment, and emerging energy technologies, the federal government needs a clearer framework for evaluating trade tools as part of a broader strategy to strengthen domestic manufacturing, secure critical infrastructure, and maintain technological leadership. Better coordination between energy leads in the government and those who are focused on trade tools is also needed.

[390] American Council on Renewable Energy. (n.d.). *Overview of Use of U.S. Trade Restrictions on Clean Energy Technology Imports*. https://acore.org/resources/overview-of-use-of-u-s-trade-restrictions-on-clean-energy-technology-imports/.

**Challenge – U.S. failure to account for carbon intensity, undermining our competitive advantage and increasing costs for consumers:** As countries implement unilateral trade measures related to carbon intensity, U.S. firms whose products are not compliant with those measures must pay a tariff, the cost of which is shifted to consumers. Even though U.S. manufacturing is often cleaner than our competitors, failure to account for carbon intensity and develop robust accounting standards, may limit our competitive advantage with trading partners.

## Policy Options:

- Conduct oversight of implementation of the congressional directive outlined in the Fiscal Year (FY) 2026 *Appropriations Committee Report* for the National Energy Technology Laboratory (NETL) to determine the average intensity of goods produced in the U.S.[391]
- Implement domestic greenhouse gas (GHG)-intensity accounting standards and regulations and corresponding GHG border adjustment mechanism (GBAM) tariffs to ensure compliance with international trade measures like the European Union (EU) Carbon Border Adjustment Mechanism (CBAM) and EU Methane Regulation (EUMR):
  - Set domestic emissions fees and/or standards where feasible to achieve near-zero methane and carbon dioxide emissions for domestic production and processing of oil and gas.
  - Set domestic GHG standards and/or emissions fees where feasible for domestic industrial production, including for specific subsectors such as steel, cement, fertilizer, and chemicals.
  - DOE should implement strong fuel- and technology-neutral energy efficiency standards on industrial equipment, so that switching from fossil-fuel burning industrial equipment to electrified industrial equipment is a viable compliance mechanism.
- Direct the Department of Commerce, U.S. Trade Representative (USTR), DOE, and EPA to develop a national strategy to assess and help the U.S. comply with foreign carbon-intensity trade measures, including analysis of impacts on U.S. competitiveness, exports, and domestic supply chains.
- Evaluate options for a U.S. GBAM or similar trade framework to prevent GHG emissions leakage, protect domestic manufacturers, and encourage trading partners to adopt comparable standards. For oil and gas specifically, this should include studying the viability of methane pollution tariffs on imports from countries that are not effectively implementing high-impact measures to reduce emissions intensity and/or have national-level average emissions intensity standards exceeding the United States'.
- Develop a standardized federal framework for measuring, reporting, and verifying industrial and energy-sector emissions intensity to provide U.S. producers with credible documentation needed to access foreign markets.
- Coordinate with allies and partners to align methodologies for GHG-intensity accounting (including for fossil fuels) measurement, reporting, and verification standards at the national level.
- Partner with other advanced economies to launch a Responsible Energy Partnership (REP) to address emissions from fossil fuel production and distribution, beginning with oil and gas methane.

## Policy Context:

Countries around the world are increasingly incorporating carbon intensity into trade policy.[392] The EU CBAM and EUMR are among the first major examples, but similar measures may emerge as governments seek to prevent carbon leakage and protect domestic industries.[393] These policies both create new costs for products with higher emissions intensity and can function as effective tariffs on U.S. exports that do not meet emerging standards. They also can generate revenue to be returned to the taxpayers of the bloc implementing the CBAM. For example, **THE EU CBAM IS ESTIMATED TO GENERATE APPROXIMATELY $2.3 BILLION PER YEAR,[394] AND A CLIMATE LEADERSHIP COUNCIL REPORT ESTIMATES A SIMILAR POLICY IN THE U.S. COULD GENERATE $120–$240 BILLION OVER 10 YEARS.[395] THE UNITED STATES HAS AN OPPORTUNITY TO TREAT THESE DEVELOPMENTS NOT ONLY AS A COMPLIANCE CHALLENGE BUT AS A COMPETITIVENESS OPPORTUNITY.** Reducing methane emissions, decarbonizing the chemical industry (which accounts for 18% of industrial $CO_2$ emissions[396] and 3% of global emissions[397]), modernizing industrial facilities, and improving emissions accounting can help maintain access to key export markets while strengthening the competitiveness of American energy and manufacturing. A coherent domestic strategy can protect U.S. firms from unfair competition, support domestic job creation, and ensure the United States helps shape the rules governing future industrial trade rather than simply reacting to them.

[391] Fleischman, C. (2025, July). *ENERGY AND WATER DEVELOPMENT AND RELATED AGENCIES APPROPRIATIONS BILL, 2026: REPORT*. United States House of Representatives, Committee on Appropriations. https://www.congress.gov/committee-report/119th-congress/house-report/213/1?outputFormat=pdf.

[392] Damborg, J. et al. (2026). The EU CBAM and the Global South: a review of the economic and geopolitical implications of unilateral climate and trade measures. *Environmental Research Letters 21*. https://iopscience.iop.org/article/10.1088/1748-9326/ae2eea/pdf.

[393] Hillman, J. & Manak, I. (2025, May). *Trade Tools for Climate Action: Carbon Border Adjustment Mechanisms*. Council on Foreign Relations. https://www.cfr.org/articles/trade-tools-climate-action-carbon-border-adjustment-mechanisms?gad_source=1&gad_campaignid=23819513442&gbraid=0AAAAD-E15mzGFXj_CJPN7C181flk3tAU&gclid=Cj0KCQjwof_QBhCgARIsADaMzOcs79l4isEhlphk9Gzl6fzE3Xwuotf5WBsb2y2R5xxNnziMxGrLZHkaAsdAEALw_wcB.

[394] Hillman, J. & Manak, I. (2025, May). *Trade Tools for Climate Action: Carbon Border Adjustment Mechanisms*. Council on Foreign Relations. https://www.cfr.org/articles/trade-tools-climate-action-carbon-border-adjustment-mechanisms?gad_source=1&gad_campaignid=23819513442&gbraid=0AAAAD-E15mzGFXj_CJPN7C181flk3tAU&gclid=Cj0KCQjwof_QBhCgARIsADaMzOcs79l4isEhlphk9Gzl6fzE3Xwuotf5WBsb2y2R5xxNnziMxGrLZHkaAsdAEALw_wcB.

[395] Nystrom, S. & Rorke, C. (2025, March). *The Council's Revenue Estimator for Pollution Fees*. Climate Leadership Council. https://clcouncil.org/report/revenue-estimator/.

[396] Myrthong, B. (2026, January). *Is the Chemical Industry Ready for Carbon Border Adjustment Mechanism?* GEP. https://www.gep.com/blog/strategy/chemical-industry-carbon-border-adjustment.

[397] Keller, A.,Yankovitz, D. et al. (n.d.). *Chemicals: Pathways to Decarbonization*. Deloitte. https://www.deloitte.com/global/en/issues/climate/pathways-to-decarbonization-chemicals.html.

BENCHMARK #7.5:

# The United States maintains military readiness by adapting to evolving supply chains and climate impacts like extreme weather and wildfire.



**MILITARY READINESS DEPENDS ON SECURE ACCESS TO ENERGY, RESILIENT INFRASTRUCTURE, AND RELIABLE SUPPLY CHAINS.** As geopolitical conditions shift and climate-related disruptions become more frequent, the ability to adapt to emerging risks is increasingly important for maintaining operational effectiveness. While this chapter focuses on military installation energy security, it is notable that fuel transport convoys in high conflict areas are a major driver of U.S. troop injuries and fatalities. Reducing demand for fossil fuel transport through electrification preserves operational readiness without compromising the military supply chain and risking lives and deserves further attention in future reports. This section provides policy options for two key challenges:

1. The impact of climate-fueled stressors on military readiness
2. The impact of grid instability on military base energy security





**Challenge – The impact of climate-fueled stressors on military readiness:** Military readiness is increasingly impacted by vulnerabilities in surrounding civilian communities, including energy system disruptions, housing instability, and climate-related stressors affecting service members and their families.

## Policy Options:

- Expand DOD energy resilience planning to include defense communities, incorporating off-base housing, local grid reliability, and regional infrastructure into installation readiness assessments.
- Establish military-community energy resilience partnerships, modeled off the Sentinel Landscapes program, providing funding and technical support to deploy microgrids, backup power, and resilient infrastructure in communities surrounding key installations.
- Track and report DOD operational disruptions caused by climate, environmental, and energy-related events, including impacts on training, deployment cycles, and personnel readiness, to inform future planning and resource allocation.
- Expand access to energy efficiency and resilience programs for communities in close proximity to bases, including military families living off base, ensuring renters and lower-income households can benefit from cost-saving and resilience-enhancing technologies.
- For remote communities close to military installations such as Alaska, invest in RD&D of off-grid clean energy generation resources that can be deployed on military installations and provide affordable, clean, and reliable energy to communities around the bases.

## Policy Context:

More than two-thirds of service members live off base, making military readiness directly dependent on the resilience of surrounding civilian infrastructure and communities.[398] Despite the pre-existing requirement for base infrastructure resilience plans,[399] climate impacts and energy disruptions increasingly affect both operational capacity and quality of life for military personnel and surrounding communities who also support base operations.[400] As climate impacts intensify, DOD must do more to bolster the security of not just the base but also the surrounding community that supports the base. DOD spends approximately $4 billion annually on facility energy costs,[401] and with electricity prices increasing 50% over the last 40 years,[402] both DOD facilities and service members living off base have had to adjust.

[398] United States Government Accountability Office. (2024, October). *Military Housing: DOD Should Address Critical Supply and Affordability Challenges for Service Members*, GAO-25-106208. https://www.gao.gov/products/gao-25-106208.

[399] United States Department of Defense. (2024, December). *DOD INSTRUCTION 4715.28 MILITARY INSTALLATION RESILIENCE*. https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/471528p.PDF.

[400] Department of Defense, Office of the Undersecretary of Defense, Acquisition and Sustainment. (2024, September). *Department of Defense 2024 2027 Climate Adaptation Plan*. https://www.sustainability.gov/pdfs/dod-2024-cap.pdf.

[401] Department of Defense, Defense Innovation Unit. (2024, December). *Defense Innovation Unit Awards Contracts to Increase Installation Resilience, Provide High Efficiency Heating and Cooling*. https://www.diu.mil/latest/defense-innovation-unit-awards-contracts-to-increase-installation-resilience.

[402] Federal Reserve Bank of Saint Louis. (2026, June). *Average Price: Electricity per Kilowatt-Hour in U.S. City Average*. https://fred.stlouisfed.org/series/APU000072610.

**Challenge – The impact of grid instability on military base energy security:** Bases are almost entirely reliant on civilian grids, and extreme weather events, including wildfires, threaten military installations, disrupt training and operations, and strain base energy systems. The bulk power system provides power to 99% of domestic military installations, but there is inadequate coordination across relevant agencies to ensure DCEI is secured.[403]

## Policy Options:

- Ensure consistent peacetime interagency communication between FERC, DOD, DOE and other key agencies and departments to ensure the grid is treated as a strategic asset.
- Consider expanding the definition of DCEI to include electric infrastructure that supports military objectives indirectly in addition to electric infrastructure that serves a Critical Defense Facility (CDF).
- Involve DOD in grid planning at the regional and local level. Facilitate tabletop exercises with regional and local grid operators to understand potential wartime impacts on the grid.
- Analyze implementation of the DOE Electricity Advisory Committee (EAC) 2022 *Strengthening the Resilience of Defense Critical Electric Infrastructure* policy recommendations, identify key gaps hindering full implementation, and pursue solutions to close identified gaps.[404]
- Expand DOD procurement and backstop purchasing authorities to support deployment of resilient energy systems on military installations.
- Stand up energy hubs on military bases by deploying advanced energy systems, including small modular reactors (SMRs) and other clean firm power technologies, along with storage, to provide reliable baseload power to the installation and support surrounding civilian grids during disruptions.
- Assess U.S. operational needs in the context of the NATO baseline resilience requirements[405] and identify key gaps, including access to liquid fuels in increasingly electrified Allied economies. Align U.S. military planning with updated NATO baseline resilience requirement and close identified gaps.
- Require comprehensive climate vulnerability assessments for all military installations, prioritizing wildfire, heat, and grid disruption risks, and integrate findings into installation planning.
- Scale earmarked funding to expand deployment of DOD installation-scale microgrids and on-site clean energy generation with islanding capability to ensure mission continuity during grid disruptions caused by wildfires or other disasters.
- Establish mutual aid agreements with state and local assets like the National Guard to coordinate energy restoration and emergency response during large-scale disasters, ensuring military assets can both maintain readiness and support civilian response without compromising mission capability.

## Policy Context:

DOD policy generally requires that military installations support and utilize local power sources. As a result, 99% of the power used by military installations comes from the civilian grid, so grid instability outside the fence line can become a readiness problem inside the fence line.[406] DOD's *Annual Energy Performance, Resilience, and Readiness Report* describes efforts to close critical energy gaps at priority locations through cyber improvements, microgrids, energy storage, and renewable generation, and DOD microgrid guidance treats resilience as the ability to maintain mission-supporting power during disruptions.[407] While this dynamic is shifting, military readiness, and therefore our national security, requires that installations be prepared as power outages and climate-fueled disasters become more frequent and severe.

Moreover, wildfires and other extreme events are increasingly and directly impacting military readiness, damaging infrastructure, limiting training capacity, and creating competition for emergency resources. For example, **IN JUST FIVE YEARS FROM 2016 TO 2021 THE NUMBER OF DAYS THE NATIONAL GUARD SPENT ON WILDLAND FIREFIGHTING INCREASED MORE THAN 12 TIMES, FROM 14,000 PERSONNEL DAYS IN 2016 TO 176,000 PERSONNEL DAYS IN 2021.[408] OVER THE LAST 10 YEARS, THE NATIONAL GUARD HAS SPENT MORE THAN 400,000 SERVICE DAYS EACH YEAR HELPING COMMUNITIES RECOVER FROM HURRICANES, WILDFIRES, AND OTHER NATURAL DISASTERS, WHICH WORKS OUT TO ROUGHLY 1,100 NATIONAL GUARD MEMBERS DEPLOYED FOR DISASTER RESPONSE ACROSS THE U.S. ON ANY GIVEN DAY.[409]** This is a major redirection of time, attention, and resources. Strengthening resilience is critical to maintaining operational capability in a climate-constrained environment.

[403] Narayanan, A. et al. (2020). *Deterring Attacks Against the Power Grid*. Rand Corporation. https://www.rand.org/content/dam/rand/pubs/research_reports/RR3100/RR3187/RAND_RR3187.pdf.

[404] Electricity Advisory Committee. (2022, March). *Strengthening the Resilience of Defense Critical Electric Infrastructure: Recommendations for the U.S. Department of Energy*. https://www.energy.gov/sites/default/files/2022-03/EAC%20Recommendations%20-%20Strengthening%20DCEI%20Resilience%20-%20Final_508.pdf.

[405] NATO. (2024, November). *Resilience, civil preparedness and Article 3*. https://www.nato.int/en/what-we-do/deterrence-and-defence/resilience-civil-preparedness-and-article-3.

[406] Narayanan, A. et al. (2020). Deterring Attacks Against the Power Grid. Rand Corporation. https://www.rand.org/content/dam/rand/pubs/research_reports/RR3100/RR3187/RAND_RR3187.pdf.

[407] Department of Defense. (2023). *ANNUAL ENERGY PERFORMANCE, RESILIENCE, AND READINESS REPORT*. https://www.acq.osd.mil/eie/ero/ier/docs/aeprr/FY23-AEPRR-Report.pdf.

[408] Cronk, T. (2022, March). *Climate Change a Critical Challenge for DOD, Hicks Says*. DoD News. https://www.war.gov/News/News-Stories/Article/Article/2959693/climate-change-a-critical-challenge-for-dod-hicks-says/.

[409] Lavelle, M. (2025, October). *Natural Disasters Are a Rising Burden for the National Guard*. Inside Climate News. https://insideclimatenews.org/news/07102025/national-guard-natural-disaster-response/.

BENCHMARK #7.6:

# The United States is a trusted diplomatic partner on global energy issues with the tools to address complex, dynamic challenges.



**GLOBAL ENERGY SYSTEMS ARE SHAPED BY INTERNATIONAL MARKETS, STRATEGIC PARTNERSHIPS, AND GEOPOLITICAL DEVELOPMENTS. ADVANCING U.S. INTERESTS IN THIS ENVIRONMENT REQUIRES STRONG DIPLOMATIC ENGAGEMENT, EFFECTIVE COORDINATION WITH ALLIES AND PARTNERS, AND THE BUREAUCRATIC CAPACITY TO RESPOND TO RAPIDLY EVOLVING GLOBAL CHALLENGES.** For additional solutions related to the capacity, continuity, and statutory mission of U.S. institutions, including those focused on foreign assistance , e.g., the U.S. Agency for International Development (USAID), see Chapter 9: Government that Delivers. This section provides policy options for four key challenges:

1. Unclear U.S. counterpart for engagement
2. Fragmented approach to international energy and climate issues
3. Sole focus on U.S. energy security demands that may limit successful energy security objectives
4. Lack of a coordinated U.S. strategy to address the intersection of climate risk, critical infrastructure, and national security



**Challenge – Unclear U.S. counterpart for engagement:** Governments looking to partner with the United States to advance their national energy goals do not have a clear counterpart with whom to engage at the embassy/mission level, thus constraining the capacity for countries to work with the U.S. and leaving space for countries like China to fill key gaps.

## Policy Options:

- **CREATE A NEW CONE OF FOREIGN SERVICE OFFICERS (FSO) FOCUSED EXCLUSIVELY ON ENERGY AND CLIMATE, REMOVING THAT DUTY FROM BOTH THE ENVIRONMENT, SCIENCE, TECHNOLOGY, AND HEALTH (ESTH) OFFICER AND ECONOMIC OFFICER AREAS OF RESPONSIBILITY (AOR). AS A PREREQUISITE FOR THIS SPECIALIZED TRACK, PROSPECTIVE OFFICERS MUST FIRST DO A FAMILIARIZATION TOUR AT DOE, EPA, OR ANOTHER RELATED DOMESTICALLY FOCUSED AGENCY, TO BETTER UNDERSTAND THE U.S. ENERGY AND ENVIRONMENT SYSTEM AND RESOURCES.**
- Increase funding for the foreign commercial service (FCS) at the Department of Commerce and energy attachés at DOE to ensure FCS officers and attachés are compensated equally and with all the same benefits as State Department FSOs.
- Create and implement a new training program to integrate into A-100 training that specifically focuses on familiarization with interagency tools available to advance clean energy and climate objectives. The training should include sections on engagement with mature, emerging, and underdeveloped markets, as well as a module facilitated by the Intelligence Community (IC) focused on strategic competition in the global energy sector and in the climate security domain. These trainings should be developed and executed by nonpartisan, career employees working with, or detailed to, the Foreign Service Institute.
- Develop and regularly update a list of target energy partner countries. These countries should be selected based on the potential to support domestic U.S. energy needs, including for critical mineral development, and the State Department should assign a minimum of two energy officers to each country.
- Maintain a confidential internal database within the State Department of U.S. companies looking to invest in energy projects overseas that is regularly updated with inputs from the Department of Commerce, including USEACs.
- Analyze the national security implications of and publish a public report comparing the reduced U.S. embassy staff footprint across all country missions with peer competitors.
- Ensure development-focused FSOs – whether at a future USAID or another entity – receive identical benefits as State Department FSOs.

## Policy Context:

U.S. domestic economic security is directly undermined by weakening a partner country's ability to secure the resources, partnerships, and market access necessary to sustain U.S. energy security and our industrial base. Under the current U.S. diplomatic structure, embassies have an ESTH FSO who acts as the liaison for the United States to their host country on key energy security issues.[410] As the current administration has restructured federal agencies, these ESTH officers, who already tend to be more junior compared to their peers and have a portfolio that is already too large to manage, are likely to pick up even more responsibilities as programs shift from USAID to the State Department to manage.

In order to have an officer in country that has capacity to most comprehensively advance U.S. energy and climate objectives, it must be its own position. Creating a new foreign service officer cone will not only create a clear counterpart for engagement with other countries on energy and climate issues, but will also increase capacity at the embassy level, be isolated from reorganizations in Washington as energy issues are moved between bureaus, and facilitate a class of FSOs that are more familiar with complex energy dynamics.

In order to have an officer in country that has capacity to most comprehensively advance U.S. energy and climate objectives, it must be its own position.

Moreover, creating dedicated resources for FSOs and embassy staff to detail private sector companies interested in investing overseas will be invaluable to identify new market opportunities and better understand demand signals from foreign counterparts, particularly in small- and medium-sizedmarkets. Because FSOs are more focused on the political economy in the country where they work, they may be less familiar with key stakeholders at home who may be interested in expanding to their AOR. Creating accessible resources can help to streamline connectivity between agencies, between State Department personnel in Washington and overseas, and between business-focused personnel who may or may not be focused on energy.

[410] United States Department of State, Under Secretary for Economic Growth, Energy, and the Environment. (n.d.). *OES Overseas*. https://2009-2017.state.gov/e/oes/hub/.

## Challenge – Fragmented approach to international energy and climate issues: The federal bureaucracy is not organized to adequately coordinate a government-wide response to international energy and climate needs.

## Policy Options:

- Establish a Deputy National Security Advisor (DNSA) for Energy and Climate on the National Security Council (NSC) and provide them with dedicated staff. The DNSA's primary task will be to serve as an interagency coordinator focused on the intersection between domestic and international energy opportunities and challenges, including adaptation and resilience issues.
- Develop an updated *National Intelligence Estimate on Climate Change* that includes a significant energy and supply chains component to inform strategic planning and resource prioritization across the national security community. This is in addition to the pre-existing focus on extreme weather impacts, fragility, geopolitical dynamics, etc. Analyze the feasibility of reactivating the Climate Security Advisory Council, including proposing a clear mission, purpose, structure, and policy nexus.[411]
- Develop an updated *Defense Climate Risk Assessment* to help identify emerging risks to military readiness and to inform long-term defense planning. This should include extreme weather impacts on critical infrastructure; supply chains, including fuel supply chains outside the United States during wartime; and strategic operations.[412]
- Develop an updated *National Adaptation Plan* to establish a coordinated, whole-of-government strategy for strengthening resilience to climate-related risks across critical infrastructure, communities, and the economy.[413]
- Establish an OGES as a component of the EOP.[414]
- As a peer counterpart to the OGES, establish an Office of Global Resilience (OGR) as a component of the EOP, structured similarly to the ONCD.[415] The office will ensure the United States advances a coherent, whole-of-government strategy to advance global resilience, including bolstering resilience to both climate-related and natural shocks. The office should be staffed with officials who have diverse backgrounds and should not have more than two officials detailed from any given agency.
- Develop the Energy Security Advisory Council, similar in structure to the Climate Security Advisory Council within ODNI, to conduct analysis of and develop an offensive strategy to disrupt Chinese dominance of energy markets, particularly in emerging markets.

## Policy Context:

The United States manages international energy, climate, critical minerals, development finance, and resilience issues across a fragmented set of institutions, including the State Department, DOE, Department of Commerce, DOD, DFC, Millenium Challenge Corporation (MCC), USTDA, and IC. While each organization plays an important role, no single entity is responsible for integrating these activities into a coherent strategy that links domestic energy security, international energy markets, strategic competition, and resilience objectives. This fragmentation can create gaps in coordination, slow decision-making, and make it difficult for partner countries and private-sector stakeholders to identify a clear U.S. counterpart for engagement. It also means, in general, that the agencies with the most funding end up dictating much of the decision-making process as they have more resources to implement relevant decisions.

Energy markets, supply chains, and infrastructure are increasingly global. Disruptions abroad, ranging from geopolitical conflicts, critical mineral export restrictions, cyber incidents, and climate-related disasters, can have immediate consequences for U.S. energy prices, industrial production, and national security. DOE's Office of International Affairs exists to coordinate international energy engagement across the Department, while the State Department maintains energy diplomacy functions through a variety of offices, including several that only exist under certain administrations. **THE GROWING INTERSECTION OF ENERGY SECURITY, CLIMATE RESILIENCE, INDUSTRIAL COMPETITIVENESS, AND STRATEGIC COMPETITION REQUIRES A MORE INTEGRATED WHOLE-OF-GOVERNMENT APPROACH THAT IS CONSISTENT ACROSS ADMINISTRATIONS.**

**THE IC HAS ALREADY CONCLUDED THAT CLIMATE CHANGE AND INTERNATIONAL RESPONSES TO IT WILL INCREASINGLY AFFECT U.S. NATIONAL SECURITY INTERESTS THROUGH ECONOMIC DISRUPTION, GEOPOLITICAL INSTABILITY, MIGRATION PRESSURES, AND COMPETITION OVER RESOURCES.[416] AS COUNTRIES INCREASINGLY INTEGRATE ENERGY SECURITY, CRITICAL MINERALS, INDUSTRIAL POLICY, AND CLIMATE RESILIENCE INTO THEIR NATIONAL SECURITY STRATEGIES, THE UNITED STATES REQUIRES A SENIOR-LEVEL COORDINATING STRUCTURE CAPABLE OF ALIGNING DOMESTIC AND INTERNATIONAL PRIORITIES AND ENSURING THAT ENERGY SECURITY IS TREATED AS A CORE COMPONENT OF NATIONAL SECURITY AND ECONOMIC STATECRAFT.**

[411] National Intelligence Council. (n.d.). *Climate Change and International Responses Increasing Challenges to US National Security Through 2040*. https://www.dni.gov/files/ODNI/documents/assessments/NIE_Climate_Change_and_National_Security.pdf.

[412] United States Department of Defense. (2021, October). *DOD Analysis Highlights Geostrategic Risks of Climate Change*. https://www.war.gov/news/news-stories/article/article/2818343/dod-analysis-highlights-geostrategic-risks-of-climate-change/.

[413] United States Department of State. (2025, January). *U.S. National Adaptation and Resilience Planning Strategy*. https://2021-2025.state.gov/office-of-the-spokesperson/releases/2025/01/u-s-national-adaptation-and-resilience-planning-strategy/.

[414] Further discussion can be found earlier in this chapter in Benchmark #7.1.

[415] Given the scoping of this chapter to focus on energy security, this is meant to serve as an indicator of the need for high-level focus on resilience and not a comprehensive set of policy recommendations.

[416] National Intelligence Council. (n.d.). Climate Change and International Responses Increasing Challenges to US National Security Through 2040. https://www.dni.gov/files/ODNI/documents/assessments/NIE_Climate_Change_and_National_Security.pdf.



**Challenge – Sole focus on U.S. energy security demands that may limit successful energy security objectives:** The United States expects other countries to fulfill U.S. energy security demands without supporting other countries' energy security objectives.

## Policy Options:

- Surge funding and ramp up staffing for technical assistance and feasibility studies across all relevant agencies supporting energy security analyses and objectives in partner countries. Ensure proper coordination between agencies to reduce duplication of efforts and maximize efficiency.
- Develop integrated energy partnership compacts for target energy partner countries to bolster their domestic energy systems consistent with their NDC goals. The proposal must include a feasibility study and analysis of current constraints to scaling clean, affordable, and reliable energy; an assessment of the country's domestic standards and governance system(s) that will govern energy buildout and related cybersecurity protections; and a set of proposed reforms, including those that facilitate private sector investment. This could be carried out by the proposed OGES outlined in Benchmark #7.1.
- Provide assistance for countries to modernize their energy markets and systems and facilitate contracts between U.S. firms that have technological solutions to add clean capacity to the grid, likely through deployment of solar and storage. This should include countries in the Global South most vulnerable to energy shocks.
- Prioritize countries that have been identified as target energy partners. If there is a clear demand for U.S. assistance (public or private), the ANCD for Energy should work to identify the greatest cybersecurity risks and prioritize cyber protections integrated into compacts, including proper standards, guardrails, and Allied procurement for those critical technologies.
- Review and, if necessary, update domestic policies to ensure our policy regime is consistent with NATO energy resilience requirements.
- Coordinate technical exchanges with other countries to bolster capacity for countries to modernize their grids, including through deployment of smart technologies and through adoption of adequate risk management principles.

## Policy Context:

Many countries that are strategically important to U.S. energy security face their own energy security challenges. These challenges often include unreliable electricity systems, limited access to affordable financing, weak transmission infrastructure, dependence on imported fuels, growing exposure to cyber threats and climate-related disasters, and a dependence or indebtedness to countries like China. When the United States engages these countries solely as suppliers of resources or strategic partners without addressing their domestic energy priorities, the United States forgoes the opportunity to help other countries develop endemic energy security systems, which results in fewer future partnerships and discounts the ability for other countries to assist the United States in the United States' own energy security goals.

Competitor nations frequently integrate infrastructure financing, technical assistance, industrial development, and diplomatic engagement into a single package. By contrast, U.S. engagement is often dispersed across multiple agencies, with funding streams that can be difficult for partner governments to navigate and may not be coordinated to achieve a strategic goal for the country or for the United States. As a result, countries may pursue partnerships that do not align with U.S. interests even when they would prefer what the U.S. may offer: higher governance standards, stronger environmental protections, and deeper engagement with U.S. experts and private sector investment.

Supporting partner countries' energy security objectives can strengthen diplomatic relationships and supply chain resilience, reduce geopolitical vulnerabilities, and create new markets for U.S. technologies. It also reduces opportunities for adversaries to install their own technologies, promote their own industries, and land countries in debt traps. A more structured approach that links domestic reforms, energy system modernization, cybersecurity assistance, workforce development, and private sector investment, can help partner countries achieve their own development goals while advancing U.S. energy security, economic competitiveness, and strategic interests.

**Challenge – Lack of a coordinated U.S. strategy to address the intersection of climate risk, critical infrastructure, and national security:** A patchwork approach to these interconnected issues risks leaving the U.S. flat-footed and unable to adequately prepare for, or respond to, future events and challenges.

## Policy Options:

- Integrate climate-driven energy disruption scenarios (e.g., wildfires, grid failures) into national security planning, including intelligence assessments, contingency planning, and international engagement strategies.
- Assess U.S. preparedness under different climate scenarios and geopolitical energy disruptions across NATO's seven baseline requirements for national resilience and develop an interagency plan to improve deficiencies.
- Modernize the Defense Support of Civil Authorities (DSCA) process to strengthen humanitarian assistance/disaster response (HA/DR), including assessing the feasibility of creating a dedicated unit comprised of experts from agencies to deploy to areas hardest hit by disasters outside the United States. The unit will provide pre-disaster training and help countries to prepare, if they anticipate disaster, and to recover post-disaster.
- Establish a training program to facilitate technical experts from partner countries to come to the United States for training to secure critical infrastructure, including through wildfire management and prevention. The State Department should work to structure memoranda of understanding (MOUs) with partner countries to define the scope of this training and potential external or partner country funding sources, modeled after the 2023 *U.S.-Saudi Arabia Agreement for Technical Cooperation.*[417]
- Deploy and bolster dual-use scientific basing in Alaska and with partner countries close to the Arctic and Antarctica, coordinating across U.S. scientific agencies and DOD. Invite Arctic and near-Arctic Allies to conduct scientific operations in Alaska and at Allied bases above the Arctic Circle. Partner with NATO Allies to conduct and practice joint, combined operations to interdict enemy naval operations in the Arctic AOR.

## Policy Context:

Climate-induced disasters are increasingly affecting critical infrastructure, particularly energy, supply chains, military installations, and international stability. Extreme heat, flooding, drought, wildfires, and severe storms can damage power systems, disrupt fuel supplies, constrain military operations, and create economic shocks that reverberate across international markets. Moreover, as adversaries like the Russia seek to access the Arctic domain with melting sea ice opening new shipping routes and the potential for deep seabed mining, new security risks emerge. These climate impacts are not isolated environmental events. Rather, they increasingly represent national security challenges that can affect U.S. interests at home and abroad.

**DESPITE THESE RISKS, CLIMATE RESILIENCE, ENERGY SECURITY, AND NATIONAL SECURITY PLANNING ARE OFTEN CONDUCTED IN POLICY SILOS. AN INTEGRATED APPROACH WILL IMPROVE THE ABILITY OF THE UNITED STATES TO ANTICIPATE DISRUPTIONS, SUPPORT ALLIES AND PARTNERS FACING CLIMATE-RELATED ENERGY CHALLENGES, AND STRENGTHEN RESILIENCE ACROSS CRITICAL INFRASTRUCTURE SYSTEMS. TREATING RESILIENCE AS A STRATEGIC NATIONAL SECURITY OBJECTIVE WOULD HELP ENSURE THAT INVESTMENTS IN ENERGY INFRASTRUCTURE, DISASTER PREPAREDNESS, CYBERSECURITY, AND INTERNATIONAL PARTNERSHIPS REINFORCE ONE ANOTHER AND CONTRIBUTE TO LONG-TERM STABILITY AND COMPETITIVENESS.**

[417] United States Department of State. (2023, May). *Agreement Between the UNITED STATES OF AMERICA and SAUDI ARABIA*. https://www.state.gov/wp-content/uploads/2023/09/23-508-Saudi-Arabia-Civil-Affairs-63358.pdf.

# Financing the Energy Future





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CHAPTER 8:

# Accessible, Low-Cost Finance for a Clean Energy Future



## Accessible, low-cost finance underwrites a thriving economy.

In just the first two years after its passage, the *Inflation Reduction Act* (IRA) spurred nearly $500 billion in clean energy investments, demonstrating how policy turned finance into a powerful engine for development.[418] Going above and beyond that progress, however, will require dismantling both longstanding and emerging barriers that trap billions of dollars of private capital on the sidelines and impede access to clean energy at scale.

The policies included in this chapter are designed to spur capital to flow faster, at scale, and over the long term into priorities like grid modernization, clean technology innovation, and deployment. Crucially, it will also ensure that the economic gains of the clean energy transition go to communities of all types, including low- and moderate-income (LMI) communities and geographies that have historically lacked access to low-cost capital.

The American financing framework in this chapter leverages a wide range of tools – including grants, loans, and a variety of supply- and demand-side incentives – to lower costs and strengthen industries and communities. While tax credits have played a critical role in mobilizing investment in clean technologies, they should be considered just one component of the broader toolkit discussed throughout this report.[419]

**TO CREATE A THRIVING ECONOMY, THIS CHAPTER FOCUSES ON ACHIEVING THE FOLLOWING BENCHMARKS TO SUPPORT ACCESSIBLE, LOW-COST FINANCE FOR A CLEAN ENERGY FUTURE:**

- **BENCHMARK #8.1:** 21st century finance tools support deploying 21st century grid infrastructure. | 213
- **BENCHMARK #8.2:** Creative finance for clean technology deployment lowers costs and delivers better outcomes for Americans. | 216
- **BENCHMARK #8.3:** Emerging technologies in nationally critical sectors are supported and de-risked through the commercialization stage. | 219
- **BENCHMARK #8.4:** Capital markets support unlocking investments in communities across America. | 221
- **BENCHMARK #8.5:** Federal programs build durable state, local, and Tribal investment capacity. | 224
- **BENCHMARK #8.6:** The financial system is resilient to emerging risks and vulnerabilities | 226

[418] Bermel, L. et al. (2024, August). *Tallying the Two-Year Impact of the Inflation Reduction Act*. Massachusetts Institute of Technology Clean Investment Monitor. https://www.cleaninvestmentmonitor.org/reports/tallying-the-two-year-impact-of-the-inflation-reduction-act.

[419] A combination of policies, such as the creation of wholesale power markets by the Energy Policy Act of 1992, tend to be more scalable and more likely to endure overtime.

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## IL–06



**IT'S AN HONOR TO HAVE BEEN INVOLVED IN THE THRIVING ECONOMY PROJECT WITH SEEC INSTITUTE, AND THANKS TO ALL WHO SUBMITTED SUCH THOUGHTFUL RECOMMENDATIONS. THE QUALITY OF THIS CHAPTER IS A DIRECT REFLECTION ON THE QUALITY OF YOUR ENGAGEMENT.**

As we crafted this chapter, we sought to stay true to three over-arching principles:

First, decarbonization will require massive capital deployment and federal spending only comprises 25% of GDP. Any effort to accelerate the deployment of capital to decarbonize our economy must understand and leverage the ways that the private sector makes investment decisions.

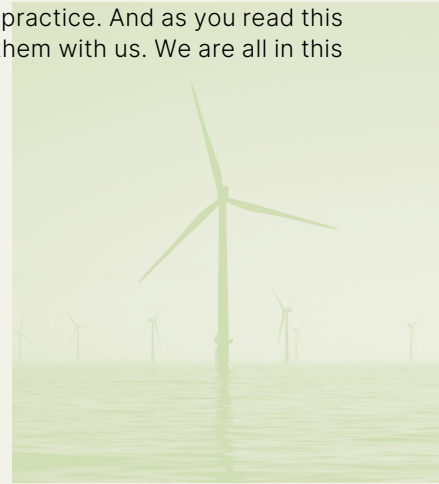
Second, the energy industry has always, and will always, be heavily regulated for the simple reason that profit-maximizing decisions alone will never ensure equitable energy access across all geographies and demographics. One should never assume that under-deployed technologies are disfavored by competitive markets – but one should craft policies that align public goals with private sector profit incentives.

Third, the financial consequences of climate change will be borne most sharply by those least able to adapt: the uninsured, those who can't afford to move, the businesses who are too small to diversify their portfolio. Good financial policy must quantify those risks and build capital buffers before the storm makes landfall.

Taken together, that means that decarbonizing our economy is both an enormous financial opportunity and a massive political threat to those who benefit from the status quo. This is no challenge for the faint-hearted. We have, as Winston Churchill said, entered an era of consequences when the time for baffling half measures has come to a close.

This report is of course not the last word on that subject. It is a start for business leaders, policy makers, and administrators to put into practice. And as you read this and have good ideas we didn't include, please share them with us. We are all in this together, after all.





BENCHMARK #8.1:

# 21st Century finance tools support deploying 21st century grid infrastructure.



**AMERICA CANNOT BUILD A MODERN ECONOMY ON THE BACK OF AN OUTDATED TRANSMISSION SYSTEM.** Electricity demand is rising rapidly as major growth drivers come online across the country, but an aging grid is slowing the connection of innovative technologies and increasing costs for ratepayers. All the while, longstanding structural dynamics fail to incentivize investment in cost-saving technologies and infrastructure buildouts. While there are many regulatory reforms discussed at length in other chapters of this report regarding the power grid, our grid must also be undergirded by financing that mobilizes long-term investment into production, innovation, and the buildout of infrastructure.[420] This section provides policy options for four key challenges:

1. Barriers that impede grid infrastructure buildouts
2. Insufficient domestic manufacturing capacity for grid technologies
3. Inefficient financing structures that limit the impact of available incentives
4. Misaligned incentives that promote expensive capital expenditures over investments that can lower ratepayer costs



[420] Further discussion of the power grid can be found in Chapter 5: Cheap, Abundant, and Clean American Energy for All.

**Challenge – Barriers that impede grid infrastructure buildouts:** Large-scale transmission infrastructure is essential to lowering electricity costs, improving grid reliability, and connecting new power sources. Yet major transmission projects often struggle to secure financing because of high upfront capital costs and long development timelines.

## Policy Options:

- Establish a transmission investment tax credit (ITC) for regionally significant infrastructure. Provide bonus incentives for projects that incorporate advanced technologies and meet clear performance criteria.
- Increase appropriations for the U.S. Department of Energy's (DOE) Transmission Facilitation Program (TFP), authorize a broad suite of flexible market-building tools, and expand eligible project types.

## Policy Context:

A new transmission ITC will facilitate the building of large regionally significant transmission projects.[421] These projects require major upfront investments, and lowering these costs would advance projects that are difficult to finance today. It will also reduce grid congestion, whose costs have increasingly been borne by ratepayers. DOE's TFP has brought transmission projects like interregional lines to market by providing financial support through mechanisms such as capacity contracts.[422] Expanding TFP, including by enhancing its flexibility to work with other federal financing, will create the conditions for unlocking investment in more robust grid infrastructure.



**Challenge – Insufficient domestic manufacturing capacity for grid technologies:** Domestic manufacturing capacity for transmission and grid-enhancing technologies has not kept pace with rising demand. Limited production capacity and reliance on globally sourced components have created supply chain bottlenecks for critical equipment such as transformers, advanced conductors, and other technologies.[423]

## Policy Options:

- Expand the Section 45X Advanced Manufacturing Production Credit to include technologies such as advanced conductors and transformers, with extended phase-out periods to provide long-term market certainty.

## Policy Context:

The Advanced Manufacturing Production Credit has shown that it can bring new manufacturing capacity online by giving companies confidence to invest in domestic production of clean technologies. From 2022 through the first quarter of 2025, investments in U.S.-based manufacturing of clean energy and transportation technologies reached $115 billion, compared to the $21 billion in the same period prior to the enactment of the IRA.[424,425] Expanding these incentives to the production of technologies like advanced conductors and transformers will build America's domestic manufacturing capacity for critical grid components.

[421] Goggin, M. & Gramlich, R. (2021, May). *Investment Tax Credit for Regionally Significant Electricity Transmission Lines: A Description and Analysis*. American Council on Renewable Energy. https://acore.org/wp-content/uploads/2021/05/Investment-Tax-Credit-for-Regionally-Significant-Electricity-Transmission-Lines-ACORE.pdf.

[422] United States Department of Energy. (n.d.). *Transmission Facilitation Program*. https://www.energy.gov/edf/transmission-facilitation-program.

[423] Berlin, K. & Willey, F. (2026, March). *Expanding Transmission Infrastructure to Achieve Low-Cost, Reliable, and Abundant Energy*. Atlantic Council. https://www.atlanticcouncil.org/in-depth-research-reports/issue-brief/expanding-transmission-infrastructure-for-low-cost-reliable-abundant-energy/.

[424] Rhodium Group. (2025, April). *Clean Investment Monitor: The State of U.S. Clean Energy Supply Chains in 2025*. https://rhg.com/research/clean-investment-monitor-us-clean-energy-supply-chains/.

[425] Pontecorvo, E. (2026, May). *Is U.S. Clean Energy Manufacturing Booming or Busting?* HeatMap News. https://heatmap.news/energy/rhodium-acp-clean-manufacturing.

**Challenge – Inefficient financing structures that limit the impact of available incentives:** Even if Congress enacts the above tax credits, market participants would still face significant barriers and frictions in monetizing those incentives in a concentrated tax equity market. A reliance on costly financing intermediaries increases transaction costs and ultimately slows deployment of technologies and infrastructure.

## Policy Options:

- Authorize transferability mechanisms for transmission-related ITC and production tax credits (PTCs) for a range of corporate and institutional buyers. Include the availability of Direct Pay so tax-exempt entities can efficiently access these incentives.
- Codify tax chaining, which links transferability and Direct Pay by allowing those who earn a tax credit to sell the credit to an entity that can convert the tax credit into a cash payment.

## Policy Context:

The IRA allowed entities in an array of clean energy projects to transfer the applicable tax credits to corporate buyers seeking to reduce their tax liability, creating a market for those credits.[426] By broadening the pool of buyers, transferability can make it easier for developers to monetize tax credits and attract clean energy investment from a wider range of institutions.[427] Developers are also then less dependent on a small group of large or specialized financial institutions (e.g., traditional tax equity structures). Expanding Direct Pay, and therefore access, to these incentives will allow organizations that cannot otherwise benefit from them as tax-exempt entities to receive the value of a tax credit as a cash payment from the federal government.[428] These organizations include states, municipalities, Tribes, and nonprofits. Finally, codifying the concept of tax chaining for clean energy tax credits will unlock the ability of public and nonprofit institutions to be partners in monetizing tax credits, enabling deeper and more ambitious public-private partnerships for energy projects.[429] Extending these approaches to the above transmission-related incentives will facilitate the development of more liquid markets, ultimately lowering the cost of the investments needed for a modern grid.

**Challenge – Misaligned incentives that promote expensive capital expenditures over investments that can lower ratepayer costs:** Utilities' traditional cost-of-service regulation often rewards them for building new physical infrastructure while providing limited incentive to pursue operational efficiencies or innovative alternatives that reduce costs for ratepayers. Because utilities earn a regulated return on capital expenditures but generally recover operating expenses at cost, they are structurally incentivized to prioritize these capital-intensive investments. This so-called cap-ex bias increases costs for ratepayers while slowing the deployment of more cost-effective technologies.

## Policy Options:

- Authorize the DOE Office of Energy Dominance Financing (EDF), through its Title 17 programs, to finance new transmission and distribution technologies, provided such solutions are credibly shown to reduce customer costs.
- Establish a race-to-the-top style grant program that rewards states for modernizing utility regulatory frameworks and adopting models that encourage the use of cost-effective infrastructure and technologies.

## Policy Context:

It is critical that the federal government facilitate utilities' investment in new technologies and flexible resources that can lower consumer costs. Congress has long recognized the importance of utility incentives. For example, the *Energy Policy Act of 2005* directed the Federal Energy Regulatory Commission (FERC) to implement incentive-based rate treatments, including performance-based approaches, to facilitate transmission investment. Broader questions involving federal regulation and oversight are addressed more fully in other chapters, particularly Chapter 5: Cheap, Abundant, and Clean American Energy for All, but aligning utility incentives with lower-cost solutions by expanding federal financing programs at DOE will be an important complement to those efforts. Similarly, a race-to-the-top style model will encourage states to adopt regulatory reforms in their own jurisdictions aimed at lowering costs, much like how competitive awards have fostered important state-level reforms in other contexts.

[426] 26 U.S.C. § 6418. https://uscode.house.gov/view.xhtml?req=granuleid:USC-prelim-title26-section6418&num=0&edition=prelim.

[427] Cranor, T., Kaercher, M., & Sweeney, K. (2024, April). *Transferability Rules Offer New Pathways for Governments and Tax Exempts; Limit Pool of Tax Credit Purchasers*. Tax Law Center at NYU Law. https://taxlawcenter.org/blog/transferability-rules-offer-new-pathways-for-governments-and-tax-exempts-limit-pool-of-tax-credit-0734665c4d8b.

[428] United States Internal Revenue Service. (2026, June). *Elective Pay and Transferability*. https://www.irs.gov/credits-deductions/elective-pay-and-transferability.

[429] Britt, C., Fins, E., Vujic, T., & Profeta, T. (2024). *Unlocking Clean Energy Projects Using Tax Chaining: A Primer*. Duke University Nicholas Institute. https://nicholasinstitute.duke.edu/sites/default/files/publications/unlocking-clean-energy-projects-using-tax-chaining-primer.pdf.

BENCHMARK #8.2:

# Creative finance for clean technology deployment lowers costs and delivers better outcomes for Americans.



**REDUCING AMERICANS' ENERGY COSTS WILL REQUIRE MAKING CLEAN TECHNOLOGIES, FROM RESIDENTIAL ENERGY UPGRADES TO VEHICLES, EASIER TO PURCHASE.** Although many technologies already provide significant savings over time, consumers often still have to absorb substantial upfront costs before receiving the benefit of public financial support. These frictions limit consumer adoption. Still, existing regulatory and financing structures fail to maximize the value of distributed energy resources (DERs) that can also lower electricity costs while improving reliability. This section provides policy options for the following three key challenges:

1. Consumer incentive frictions and inaccessibility
2. Affordability barriers to transportation electrification
3. Financing structures that limit the ability to aggregate DERs on a broader scale



**Challenge – Consumer incentive frictions and inaccessibility:** Many families cannot afford to pay the upfront costs of home upgrades like heat pumps and weatherization even if they would save them money over time. The *One Big Beautiful Bill Act* (*OBBBA*) repealed two of the government's primary incentives for residential clean energy and energy efficiency investments – Section 25C tax credits for home energy efficiency improvements and Section 25D tax credits for residential clean energy systems.

## Policy Options:

- Restore Section 25C and Section 25D credits and make them refundable so taxpayers obtain the full benefit of the credit.
- Design and structure key consumer-facing incentives to maximize uptake by reducing barriers to access, such as with point-of-sale rebate mechanisms.

## Policy Context:

"To change behavior, [consumer] credits need to be valuable enough to make behavior change worthwhile, taxpayers need to be aware that the credits exist, and the credits need to be easily claimable," as one group of tax law experts recently noted.[430] Making restored Section 25C and 25D credits refundable ensures that LMI households in particular receive the full benefit of the credit regardless of tax liability. Moreover, Congress and implementing agencies should design consumer-facing incentives to reduce administrative and financing frictions, for example, through point-of-sale rebate mechanisms that allow the value of a credit to be applied at the time of purchase. This model benefits from precedents in the electric vehicle (EV) market, where point-of-sale delivery led to strong consumer uptake.[431] While this exact template may not be replicable across all sectors, minimizing the upfront costs and administrative frictions for consumer-facing incentives will increase participation and these credits' effectiveness.[432]

**Challenge – Affordability barriers to transportation electrification:** The repeal of the Section 30D new clean vehicle and Section 25E used clean vehicle tax credits under the OBBBA removed the primary policies bolstering demand for these vehicles and their underlying technologies. Even when supply-side support (such as through manufacturing tax credits) is still available, without complementary demand-side incentives, manufacturers will face great uncertainty about whether there will be a future market for their products, weakening the incentive to invest in domestic production. Moreover, higher upfront vehicle costs, the absence of durable incentives for heavy-duty and fleet vehicles, and spotty nationwide charging infrastructure further slow transportation electrification.

## Policy Options:

- Restore consumer vehicle incentives by reinstating the Section 30D and Section 25E clean vehicle tax credits, including the transfer-to-dealer provisions that allowed consumers to claim the credit for a reduction in vehicle price.
- Restore and expand the Section 30C credit for residential and commercial vehicle charging infrastructure.
- Establish a technology-neutral tax credit for clean heavy-duty and fleet vehicles.

## Policy Context:

A durable transportation strategy should reinforce both supply and demand functions for clean vehicles and their underlying technologies. Restoring consumer incentives for electric vehicles, developing new incentives for the purchase of heavy-duty and commercial fleet vehicles, and supporting charging infrastructure will strengthen demand, thereby giving manufacturers benefiting from production credits greater confidence to invest in the U.S. Structuring such incentives to be available at the point of sale will also ensure that consumers can better benefit from them despite initial cost constraints.

[430] Barkdoll, E., Lee, T., & Lutz, D. (2026). *Implementing the Inflation Reduction Act: Practical Lessons from the Largest Clean Energy Incentive Rollout in U.S. History*. Clean Energy Tax Blueprint. https://www.cleanenergytaxblueprint.org/.

[431] United States Department of the Treasury. (2024, June). *U.S. Department of the Treasury Announces More Than $1 Billion in Upfront Savings for Consumers on Electric Vehicle Sales*. https://home.treasury.gov/news/press-releases/jy2403.

[432] Similar consumer-focused reforms are discussed in Chapter 3: Thriving, Affordable, Resilient Communities.



**Challenge – Financing structures that limit the ability to aggregate DERs on a broader scale:** Financing models routinely treat DERs as isolated assets rather than as aggregated, system-wide resources, keeping these technologies operating at a small scale.[433,434] These kinds of financing barriers undermine these technologies' potential to improve grid reliability and mitigate peak demand.

## Policy Options:

- Provide capital to green banks and community-lending institutions to finance virtual power plants (VPPs) via novel and low-cost financing mechanisms.[435]
- Expand DOE's authority and funding under Title 17 to clearly support innovative VPPs and DER aggregation strategies.

## Policy Context:

DERs can deliver far more value when they are coordinated, rather than treated individually. They can be deployed quickly and address major cost drivers like load growth and peak demand.[436] Green banks are well-positioned to facilitate creative financing strategies that increase VPP participation among communities of all types, as well as community-lending institutions who are looking to enter this market.[437] Additional federal financial support would develop these solutions on a greater scale.[438] Recent private-sector precedents also demonstrate how innovative financing partnerships can scale these approaches. Legislation should seek to work synergistically with these mechanisms that are already emerging in financial markets.[439]

[433] McDonnell, M., Nelson, R., & Mims Frick, N. (2025, January). *New Report Discusses Regulatory Framework for Distributed Energy Resources Compensation*. Lawrence Berkeley National Laboratory. https://emp.lbl.gov/news/new-report-discusses-regulatory-framework-distributed-energy-resources-compensation.

[434] Cohen, J., Shwisberg, L., & Dyson, M. (2025, November). *How Virtual Power Plants Can Help the United States Win the AI Race*. Rocky Mountain Institute. https://rmi.org/how-virtual-power-plants-can-help-the-united-states-win-the-ai-race/.

[435] Feygin, Y., Lala, C., & Arun, A. (2024, July). *Virtual Power Plants*. Center for Public Enterprise. https://publicenterprise.org/wp-content/uploads/CPE-VPP-Report-July-2024-1.pdf.

[436] Rocky Mountain Institute. (2025, September). *Virtual Power Plants, Energy Affordability Toolkit*. https://affordability-toolkit.rmi.org/policies/virtual-power-plants.

[437] Moritz, J. (2025, August). *CT starts AI-driven 'virtual power plant' energy storage program*. CT Mirror. https://ctmirror.org/2025/08/27/ct-virtual-power-plant-ai/.

[438] Flood, G. (2026, July). *Gridlocked: How Public Power Can Build the Grid of the Future and Lower Bills Now*. Groundwork Collaborative. https://groundworkcollaborative.org/work/gridlocked/.

[439] Lutz, M. (2026, June). *Google to Fund 100-MW Virtual Power Plant in PJM in 'First-of-Its-Kind' Deal*. Utility Dive. https://www.utilitydive.com/news/google-virtual-power-plant-vpp-pjm-voltus/821838/.

BENCHMARK #8.3:

# Emerging technologies in nationally critical sectors are supported and de-risked through the commercialization stage.



**POLICYMAKERS MUST ALSO ADDRESS THE PERSISTENT FINANCING GAPS THAT PREVENT PROMISING TECHNOLOGIES FROM ACHIEVING COMMERCIAL SCALE. FEDERAL FINANCING PROGRAMS HAVE, FOR TOO LONG, FOCUSED ON LOWER-RISK, PROVEN TECHNOLOGIES OVER THE KINDS OF HIGHER-RISK INVESTMENTS NEEDED TO ACCELERATE A THRIVING ECONOMY.** With bold yet prudent risk-taking, federal investment programs can build new markets and unlock technologies that would otherwise remain underfunded. Many innovative technologies also struggle to attract investment because they lack durable demand signals. Policy can help create those markets by more strategic use of tools such as procurement, contracts for difference (CfD), and other forms of demand-side support, as is also discussed in Chapter 6: Next-Generation Energy Technology Researched, Developed, and Built in America. By combining risk-tolerant financing with market-building tools, the government can catalyze investment in critical technologies and industries. This section provides policy options for two key challenges:

1. Risk aversion at federal public investment programs
2. Overcoming the innovation valley of death



## Challenge – Risk aversion at federal public investment programs:

Many federal investment programs have been managed with a level of risk tolerance more appropriate for commercial banks than for public institutions tasked with advancing next-generation innovation and market creation. As a result, they have too often focused on supporting mature, lower-risk projects, while promising but higher-risk technologies face persistent funding gaps between early-stage and commercial viability.

### Policy Options:

- Direct high-priority public investment programs to prioritize the pursuit of long-term innovation and economic transformation.
- Require transparency on these programs' portfolio-level outcomes, as well as investment criteria, underwriting practices, and risk management practices, to enhance accountability to the public.

### Policy Context:

Public investment programs should operate where private capital cannot or will not go. Providing statutory direction that these programs should prioritize innovation and long-term transformational upside will empower agencies to more consistently back technologies that are currently perceived as too risky by investors, as well as deeper investment in communities where access to affordable financing has historically been out of reach. Moreover, evaluating a program's performance at the portfolio level, rather than project-by-project, recognizes that risk-taking across a diverse portfolio is essential to success. To that end, greater transparency into an agency's underwriting and risk management practices will help the public hold these agencies accountable for whether they are seeking out the kind of transformational upside needed to achieve a thriving economy.

## Challenge – Overcoming the innovation valley of death:

The valley of death occurs between a technology moving from early-stage to commercial viability, where projects may struggle to secure customers hesitant to back new products. While the IRA significantly expanded domestic production, many critical clean technologies still face uncertain demand, making it difficult to mobilize private investment and achieve commercial viability.[440]

### Policy Options:

- Clarify and expand demand-side authorities at DOE, the General Services Administration (GSA), and the U.S. Department of Defense (DOD) to include tools like offtake agreements, contracts for difference, price floors, and other demand-support mechanisms.
- Authorize DOE to establish a market-wide price insurance program in strategic sectors like oxide production and critical minerals.[441]
- Establish dedicated funding set-aides within high-priority public investment programs to support first-of-a-kind demonstrations.

### Policy Context:

**COMPLEMENTING SUPPLY-SIDE INCENTIVES WITH DEMAND-SIDE SUPPORT CAN SECURE EARLY MARKETS AND ACCELERATE KEY TECHNOLOGIES' PATH TO COMMERCIALIZATION. THESE TECHNOLOGIES OFTEN FAIL TO ATTRACT PRIVATE INVESTMENT DUE TO THE LACK OF A LONG PERFORMANCE HISTORY OR BUYERS CAPABLE OF CREATING A VIABLE MARKET. DEDICATED FEDERAL DEMONSTRATION FUNDING BRIDGES THIS GAP BY GENERATING EARLY PERFORMANCE DATA NEEDED TO TURN PROMISING INNOVATIONS INTO BANKABLE PROJECTS.** Demand-pull tools empower the government to provide the certainty needed to unlock private investment. These approaches build on recent federal precedents, particularly in the defense and mineral sectors, where the government's purchasing commitments have built nascent markets.[442,443] By providing demonstration support and sending clear demand signals, policymakers can bring greater certainty to markets and mobilize private capital behind critical technologies and industries.

[440] Papapolyzou, D. & Corbeau, A. (2024, November). *The US Has a Hydrogen Demand Problem–Despite Generous Incentives*. Center on Global Energy Policy, Columbia University. https://www.energypolicy.columbia.edu/the-us-has-a-hydrogen-demand-problem-despite-generous-incentives/.

[441] Deese, B., Khan, Z., and Reese, R. (2026, April). *Concentrating Risk Without Promoting Resilience: What the MP Materials Deal Means for U.S. Critical Mineral Strategy*. MIT Center for Energy and Environmental Policy Research. https://ceepr.mit.edu/wp-content/uploads/2026/04/MIT-CEEPR-RC-2026-02.pdf.

[442] MP Materials. (2025, July). *MP Materials Announces Transformational Public-Private Partnership with the Department of Defense to Accelerate U.S. Rare Earth Magnet Independence*. https://mpmaterials.com/news/mp-materials-announces-transformational-public-private-partnership-with-the-department-of-defense-to-accelerate-u-s-rare-earth-magnet-independence/.

[443] Wu, A. (2025, July). *Unpacking the DoD-MP Materials Partnership*. Federation of American Scientists. https://fas.org/publication/unpacking-dod-and-mp-partnership/.

BENCHMARK #8.4:

# Capital markets support unlocking investments in communities across America.



**AMERICA'S FINANCIAL MARKETS ARE THE DEEPEST AND MOST LIQUID IN THE WORLD, YET LMI COMMUNITIES CONTINUE TO FACE BARRIERS ACCESSING FINANCING FOR CLEAN TECHNOLOGIES. SUCH BARRIERS OFTEN REFLECT A MISMATCH BETWEEN TRADITIONAL FINANCE AND THE UNIQUE CHARACTERISTICS OF COMMUNITY-SCALE PROJECTS, WHICH CAN BE SMALLER, GEOGRAPHICALLY DISPERSED, AND BESPOKE.**[444] At the same time, the institutions well positioned to serve these markets because of their local relationships and pipelines, e.g., community-lending institutions and state and local green banks, are constrained by a lack of balance sheet and technical capacities. Federal investment can strengthen the infrastructure needed to expand clean technology investment in underserved communities. This section provides policy options for three key challenges:

1. Insufficient balance sheet capacity at community-lending institutions and state and local green banks
2. Fragmented technical capacity
3. Lack of consistent data and standardization needed to catalyze private capital and build secondary markets



[444] Mann, W. (2026, February). *Financing Community Clean Energy Projects in 2026*. Rocky Mountain Institute. https://rmi.org/resources/financing-community-clean-energy-projects-in-2026/.

**Challenge – Insufficient balance sheet capacity at community-lending institutions and state and local green banks:** Community-lending institutions and state and local green banks lack consistent sources of low-cost capital needed to extend affordable loans for energy efficiency improvements and other clean technology investments. Without more robust sources of low-cost, patient capital and new risk-sharing mechanisms, these institutions will be less able to underwrite green financing projects in LMI communities on a larger scale, limiting the broad-based adoption of clean technology.

## Policy Options:

- Expand enterprise-level capital support to state and local green banks and community-lending institutions through the U.S. Department of the Treasury, the U.S. Department of Housing and Urban Development (HUD), DOE, and other agencies' financing facilities via low-cost financing, loan guarantees, and other risk-sharing mechanisms.

## Policy Context:

According to a 2025 Richmond Federal Reserve survey, 40% of Community Development Financial Institution (CDFI) loan funds identified lending capital, particularly the cost of capital, as their most pressing challenge.[445] Enterprise-level capitalization from federal agencies addresses this by expanding lenders' balance sheet capacity, enabling these institutions to extend credit to borrowers that might otherwise fall outside their historical lending practices. That enables the federal government to transform capital-constrained lenders into more established financing platforms capable of deploying clean technologies over the long term.

**Challenge – Fragmented technical capacity:** Community-lending institutions and state and local green banks can lack the specialized technical and operational capacity needed to finance projects on a broader scale.[446] Without bolstering this capacity, community-level clean energy projects will struggle to get off the ground even where capital and demand are available.[447]

## Policy Options:

- Provide dedicated funding for Treasury-administered technical assistance and capacity-building grants to help community-lending institutions and state and local green banks build and manage larger green financing programs.
- Establish regional technical assistance hubs to provide low-cost advisory services, transaction-level support, workforce development, and peer learning.

## Policy Context:

Transitioning to scaled clean technology financing requires an expanded playbook and deep area expertise. By expanding the Treasury Department's resourcing for technical assistance programs, the federal government will help community-lending institutions and state and local green banks build the expertise, controls, and operations needed for developing larger green investment programs. Regional technical assistance hubs further accelerate this transition by providing shared expertise, workforce training, and other services at a low cost.[448]

[445] Carpenter, S. & Pessin, T. (2025, September). *Federal Reserve CDFI Survey Key Findings Report*. Federal Reserve Bank of Richmond. https://www.richmondfed.org/region_communities/regional_data_analysis/cdfi_survey/survey_results/cdfi_survey_key_findings_2025.

[446] United States Government Accountability Office. (2024, March). *Economic Development: Additional Training Could Help Small Lenders Implement Technology*, GAO-24-106226. https://www.gao.gov/products/gao-24-106226.

[447] Hangen, E., Kent, A., Duenas, M., & Luk-Li, J. (2026, January). *Resilient Communities and Affordable Energy: Charting Roles for Community Finance*. Natural Resources Defense Council and the University of New Hampshire Center for Impact Finance. https://www.nrdc.org/sites/default/files/2026-02/Resilient_Communities_and_Affordable_Energy_Charting_Roles_for_Community_Finance.pdf.

[448] United States Environmental Protection Agency. (2023, April). *Biden-Harris Administration Announces $177 Million for 17 New Technical Assistance Centers Across the Nation to Help Communities Access Historic Investments to Advance Environmental Justice*. https://www.epa.gov/newsreleases/biden-harris-administration-announces-177-million-17-new-technical-assistance-centers.



**Challenge – Lack of consistent data and standardization needed to catalyze private capital and build secondary markets:** Community-level green lending markets lack standardized reporting and easily comparable performance data, making it difficult for private capital to evaluate projects and opportunities and invest at scale. Without consistent and reliable information, these loans cannot be easily aggregated into investable products and robust secondary markets.

## Policy Options:

- Direct the Treasury Department to develop a core set of government-wide reporting standards aimed at improving comparability across community-level projects and lowering due diligence costs, while allowing agencies the flexibility to supplement with program-specific reporting.[449]
- Direct the Treasury Department to collect and publish detailed, granular data from CDFIs on loan origination, underwriting practices, and performance, among others, to enhance market transparency.[450]

## Policy Context:

**COMMUNITY-LENDING INSTITUTIONS HAVE LONG DEMONSTRATED THE ABILITY TO ORIGINATE LOANS IN UNDERSERVED MARKETS, BUT FRAGMENTED REPORTING AND LIMITED ACCESS TO COMPARABLE DATA INCREASE DUE DILIGENCE COSTS AND LIMIT PRIVATE CAPITAL PARTICIPATION. DEVELOPING A MORE CENTRALIZED DATA AND REPORTING INFRASTRUCTURE – SUCH AS DETAILED INFORMATION ON LOAN ORIGINATION, UNDERWRITING PRACTICES, AND PORTFOLIO PERFORMANCE – AND MORE CONSISTENT COMMUNITY BENEFIT METRICS, WILL ALLOW INVESTORS TO BETTER ASSESS RISK, COMPARE PROJECTS, AND EVALUATE THE IMPACT OF THEIR INVESTMENTS. OVER TIME, STANDARDIZED DATA AND IMPROVED TRANSPARENCY HELP CREATE MORE DURABLE MARKETS FOR GREEN LENDING.[451]**

[449] Hayes, D. et al. (2026, June). *Increasing Accessibility to Trusted Climate Performance Data*. Stanford Law and Policy Lab. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=686388.

[450] Scott, J. Carmelita Recto, M., & Kivell, J. (2024, January). *What Would It Take to Create a More Robust Secondary Market for CDFI Loans?* The Teller Window, Federal Reserve Bank of New York. https://tellerwindow.newyorkfed.org/2024/01/08/what-would-it-take-to-create-a-more-robust-secondary-market-for-cdfi-loans/.

[451] Scott, J., Carmelita Recto, M., & Kivell, J. (2025, February). *Creating a More Robust Secondary Market for CDFI Loans: Insights from CDFI Loan Funds*. The Teller Window, Federal Reserve Bank of New York. https://tellerwindow.newyorkfed.org/2025/02/19/creating-a-more-robust-secondary-market-for-cdfi-loans-insights-from-cdfi-loan-funds/.

BENCHMARK #8.5:

# Federal programs build durable state, local, and Tribal investment capacity.



**STATES, LOCALITIES, AND TRIBES SIT AT THE CENTER OF CLEAN ENERGY AND INFRASTRUCTURE INVESTMENT BUT LACK DURABLE FINANCIAL TOOLS AND IN-HOUSE CAPACITY.** Strengthening their capacity is therefore not just an administrative issue but also a financing strategy that can multiply the impact of federal clean energy investments. This section provides policy options for two key challenges:

1. Lack of durable financing structures at the subnational level
2. Insufficient technical capacity at the subnational level



## Challenge – Lack of durable financing structures at the subnational level:

Much federal funding to states is structured as one-time appropriations that do not replenish. As a result, subnational entities often lack mechanisms to recycle repaid loans into new projects. This hinders the development of states as durable partners that could help local financing institutions deploy clean technologies over the long-run and beyond federal electoral cycles.

### Policy Options:

- **ESTABLISH A CLEAN ENERGY STATE REVOLVING FUND (SRF), MODELED ON THE U.S. ENVIRONMENTAL PROTECTION AGENCY'S (EPA) CLEAN WATER (CWSRF) AND DRINKING WATER (DWSRF) PROGRAMS, TO PROVIDE STATES WITH CAPITALIZATION FUNDING TO ESTABLISH AND SUSTAIN REVOLVING CLEAN ENERGY FUNDS.**
- Expand funding and eligibility for DOE's State Energy Financing Institutions (SEFIs) to facilitate a variety of approaches to finance residential energy efficiency and electrification, community solar, industrial facilities, and grid-interactive appliances.[452]

### Policy Context:

Revolving fund structures transform public appropriations into durable financing pools.[453,454] By recycling loan repayments, subnational governments can grow lending capacity over time. This model also facilitates the building of longer-term borrower relationships within state, local, and Tribal governments. Experience with water infrastructure revolving funds at the EPA demonstrates how these structures can significantly amplify the impact of federal funding. Building upon a federal investment of $62 billion, EPA's CWSRF has provided $194 billion to American communities through 2025.[455] Expanding these mechanisms to different sectors creates more durable financing platforms at the subnational level. In addition, SEFIs are entities established by state or Tribal governments to provide financial support for eligible clean energy projects.[456] Yet SEFI funding has to date been underutilized.[457] **EXPANDING ELIGIBILITY FOR FEDERAL SEFI FUNDING WILL ENABLE SEFIs TO BETTER SERVE AS A BRIDGE BETWEEN FEDERAL RESOURCES AND A WIDER ARRAY OF LOCAL PROJECTS, WHILE BOLSTERING SUBNATIONAL GOVERNMENTS' INVESTMENTS IN CLEAN ENERGY PROGRAMS.[458]**

## Challenge – Insufficient technical capacity at the subnational level:

Many smaller jurisdictions lack the specialized expertise required to navigate federal funding applications, structure complex multi-party infrastructure deals, and review utility industry capital investment plans as required under state law. This capacity gap slows deployment, increases reliance on external parties for technical expertise, and disadvantages LMI communities in competitive funding processes.

### Policy Options:

- Expand technical assistance programs for states, localities, and Tribes to build internal capacity and expertise to expand local green financing markets.
- Establish grants to state public utility commissions (PUCs) and consumer advocate offices to build their oversight capacity of utility capital investment plans.[459]

### Policy Context:

Technical assistance is a multiplier for federal investment. **STRENGTHENING INTERNAL CAPACITY WITHIN SUBNATIONAL GOVERNMENTS ENSURES THAT SMALLER AND LESS-RESOURCED JURISDICTIONS CAN COMPETE EFFECTIVELY FOR FEDERAL FUNDING, REDUCING GEOGRAPHIC DISPARITIES IN FEDERAL POLICY. OVER TIME, BUILDING TECHNICAL CAPACITY CREATES A MORE MATURE PUBLIC FINANCE ECOSYSTEM CAPABLE OF OVERSEEING LARGER-SCALE DEPLOYMENT AND DOING SO WITHOUT LONG-TERM RELIANCE ON FEDERAL SUPPORT.** Such investments protect ratepayers from rising electric bills as well. Expanding technical assistance to state PUCs equips them to more rigorously evaluate utilities' capital expenditure plans and ensure that utilities are spreading costs over more users.[460]

[452] United States Department of Energy, Office of Energy Dominance Financing. (n.d.). *State Energy Financing Institutions (SEFI)-Supported Projects*. https://www.energy.gov/edf/state-energy-financing-institutions-sefi-supported-projects.

[453] Pitkin, J., Deason, J., & Leventis, G. (2024, June). *Revolving Loan Fund Case Studies: Prepared to Support the Energy Efficiency Revolving Loan Fund Capitalization Grant Program*. United States Department of Energy. https://www.energy.gov/sites/default/files/2024-07/rlf-case-studies-executive-summary-and-6-case-studies.pdf.

[454] Feygin, Y. & Lala, C. (2024, August). *Revolving Loan Funds*. Center for Public Enterprise. https://publicenterprise.org/report/revolving-loan-funds/.

[455] United States Environmental Protection Agency. (n.d.). *About the Clean Water State Revolving Fund*. https://www.epa.gov/cwsrf/about-clean-water-state-revolving-fund-cwsrf.

[456] United States Department of Energy, Office of Energy Dominance Financing. (n.d.). *State Energy Financing Institutions (SEFI)-Supported Projects*. https://www.energy.gov/edf/state-energy-financing-institutions-sefi-supported-projects.

[457] Winslow, K. (2025, November). *Revisiting the LPO State Energy Financing Institution program*. https://substack.com/home/post/p-177585966.

[458] Arun, A. (2023, December). *State Energy Financing Institutions: Unlocking Billions in Concessional Financing from the LPO*. Center for Public Enterprise. https://publicenterprise.org/wp-content/uploads/SEFI-Briefing-II-1.pdf.

[459] PowerLines. (2026, April). *Capital Expenditures and Utility Oversight: A Report for State Regulators*. https://powerlines.org/wp-content/uploads/2026/04/0413_PowerLines-CapEx-Report.pdf.

[460] PowerLines. (2026, April). *Capital Expenditures and Utility Oversight: A Report for State Regulators*. https://powerlines.org/wp-content/uploads/2026/04/0413_PowerLines-CapEx-Report.pdf.

**BENCHMARK #8.6:**

# The financial system is resilient to emerging risks and vulnerabilities.



**AMERICA'S FINANCIAL REGULATORY SYSTEM PLAYS A CRITICAL ROLE IN IDENTIFYING AND RESPONDING TO VULNERABILITIES ACROSS FINANCIAL MARKETS, ENSURING THAT SHOCKS DO NOT IMPAIR THE FINANCIAL SYSTEM'S ABILITY TO UNDERWRITE A THRIVING ECONOMY.** Extreme weather events are increasingly affecting our economic lives, and financial market participants are not immune.[461] These challenges are perhaps most visible in insurance markets, as discussed in Chapter 3: Thriving, Affordable, Resilient Communities. Yet market participants lack consistent, comparable, and decision-useful information about these risks and their associated opportunities. Addressing these gaps will improve market participants' ability to assess climate-related financial risks and the resilience of America's financial system. This section provides policy options for four key challenges:

1. Inconsistent disclosure of climate and weather-related risks
2. Insufficient public access to high-quality, standardized climate data
3. Lack of climate scenario planning within federal banking regulators' regulatory frameworks
4. Weak market mechanisms for verifying climate-related data and information in voluntary carbon markets



[461] Bloomberg. (2026, July). *How Extreme Heat Is Shifting Corporate Bottom Lines*. https://www.bloomberg.com/news/articles/2026-07-23/extreme-heat-is-generating-corporate-winners-and-losers.

**Challenge – Inconsistent disclosure of climate and weather-related risks:** Current voluntary reporting practices for climate risk vary widely in methodology and assumptions, greatly limiting the availability of consistent, comparable, and reliable information. These gaps make it more difficult for investors to assess a given firm's risk and opportunity profile, increasing information asymmetries and reducing the efficiency with which America's markets price and allocate risk.

## Policy Options:

- Require enhanced corporate disclosure of climate-related data and risks by expanding the Greenhouse Gas Reporting Program (GHGRP) at EPA or at federal financial agencies.
- Direct the development of a standardized federal accounting framework with rigorous and consistent methodologies for accounting for greenhouse gas (GHG) emissions and other climate data.[462]

## Policy Context:

**STANDARDIZED CORPORATE DISCLOSURE IS THE FOUNDATIONAL STEP TO ENSURING THAT INVESTORS HAVE CONSISTENT, COMPARABLE, AND DECISION-USEFUL INFORMATION. HIGHER-QUALITY INFORMATION REDUCES INFORMATION ASYMMETRIES, ENABLING INVESTORS TO MAKE BETTER-INFORMED DECISIONS AND, IN TURN, CONTRIBUTING TO A LOWER COST OF CAPITAL.** The International Sustainability Standards Board (ISSB), for example, has established a global baseline of sustainability reporting standards so that investors can compare these risks across companies.[463] Better understanding of climate risks will help American investors protect their money and identify new opportunities.



**Challenge – Insufficient public access to high-quality, standardized climate data:** Although the federal government collects a vast amount of high-quality climate and environmental data, these datasets are often fragmented across agencies, difficult to integrate, and lack consistent methodologies. This limits their decision-usefulness for market participants and the public.

## Policy Options:

- Strengthen the nation's public climate data infrastructure by expanding investments in the National Oceanic and Atmospheric Administration (NOAA), the National Aeronautics and Space Administration (NASA), the Federal Emergency Management Agency (FEMA), and other agencies to improve the standardization and interoperability of datasets across the government.[464]
- Authorize the Treasury Department to collect comprehensive insurance market data to improve transparency into insurance availability, affordability, and risks.[465]

## Policy Context:

The federal government already collects vast amounts of high-quality climate, weather, geospatial, and disaster-related data from agencies such as NOAA, NASA, the U.S. Geological Survey (USGS), FEMA, and others.[466,467,468] Improving data collection, standardization, and coordination across agencies and departments will enable the government, financial market participants, and the public to more accurately assess their exposure to climate-related risks.[469]

[462] Hayes, D. et al. (2025, May). *Increasing Accessibility to Trusted Climate Performance Data*. Stanford Law School Law and Policy Lab. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=6863883.

[463] International Financial Reporting Standards Foundation. (n.d.). *Introduction to the ISSB and IFRS Sustainability Disclosure Standards*. https://www.ifrs.org/sustainability/knowledge-hub/introduction-to-issb-and-ifrs-sustainability-disclosure-standards/.

[464] United States Government Accountability Office. (2024, August). *Climate Resilience: Congressional Action Needed to Enhance Climate Economics Information and to Limit Federal Fiscal Exposure*, GAO-24-106937. https://www.gao.gov/products/gao-24-106937.

[465] United States Department of the Treasury. (2024, October). *Treasury Releases National Climate Resilience Strategy for the Insurance Sector and Announces Related Actions*. https://home.treasury.gov/news/press-releases/jy2791.

[466] See, e.g., National Aeronautics and Space Administration. (n.d.). *Earth Science Data*. https://science.nasa.gov/earth/data/.

[467] See, e.g., National Oceanic and Atmospheric Administration. (n.d.). *NOAA's GeoPlatform – Geospatial Data*. https://www.climate.gov/maps-data/dataset/noaas-geoplatform-geospatial-data-maps-apps.

[468] See, e.g., Federal Emergency Management Agency. (n.d.). *OpenFEMA*. https://www.fema.gov/about/reports-and-data/openfema.

[469] Additional discussion regarding insurance-related risks can be found in Chapter 3: Thriving, Affordable, Resilient Communities.

**Challenge – Lack of climate scenario planning within federal banking regulators' regulatory frameworks:** Climate scenario analyses provide a forward-looking framework for evaluating how different climate-related risks could affect financial institutions, but their use remains limited within the U.S. financial regulatory system. These analyses help regulators and financial institutions alike assess potential impacts from risks such as extreme weather events.

## Policy Options:

- **REQUIRE BANKING REGULATORS TO CONDUCT SCENARIO ANALYSES FOR LARGE FINANCIAL INSTITUTIONS IN ORDER TO HELP INSTITUTIONS AND REGULATORS IDENTIFY, MEASURE, AND MANAGE CLIMATE-RELATED FINANCIAL RISKS.**

## Policy Context:

The goal of scenario analyses is to spur financial institutions to evaluate the financial impacts of a range of plausible climate-related risk scenarios. In 2023, the Federal Reserve initially demonstrated the use of climate scenario analyses, and similar exercises are now widely used among many leading central banks.[470,471] By incorporating forward-looking climate scenarios, regulators can work with financial institutions to identify vulnerabilities before they materialize and strengthen internal risk management practices.

**Challenge – Weak market mechanisms for verifying climate-related data and information in voluntary carbon markets:** Voluntary carbon markets remain beset by inconsistent verification standards and limited transparency, reducing the ability of markets to allocate capital efficiently toward real and verifiable climate solutions.

## Policy Options:

- Establish federal standards, harmonized to the extent practicable with international counterparts, for carbon credit quality, verification, and transparency across relevant federal agencies, such as EPA and DOE.
- Create a centralized verification system or registry within EPA, DOE, or on an interagency basis, to improve reliability and prevent double counting.

## Policy Context:

Carbon markets have faced persistent questions about their integrity, especially regarding additionality, verification, and durability.[472] Substantial work on these questions is underway globally, albeit largely still on a voluntary basis.[473] Greater transparency and more consistent, credible verification mechanisms are needed to improve confidence and facilitate more accurate pricing in a market characterized by competing standards and methodologies.[474] With better data and standardization, participants in carbon markets can more reliably invest in projects that deliver measurable emissions reductions. These improvements in the U.S. will strengthen market integrity and the alignment between financial incentives and decarbonization outcomes.

[470] Board of Governors of the Federal Reserve System. (2023, January). Pilot Climate Scenario Analysis Exercise: Participant Instructions. https://www.federalreserve.gov/publications/files/csa-instructions-20230117.pdf.

[471] European Central Bank. (2026, January). *ECB Advances Climate and Nature Work After Delivering on Its 2024–2025 Plan*. https://www.ecb.europa.eu/press/pr/date/2026/html/ecb.pr260116~4b4a05a179.en.html.

[472] Shortell, E., Goodson, D., Patnaik, S., & Kane, A. (2026, May). *Which Agency Should Regulate Carbon Credits in the U.S.?* New York University Law School. https://policyintegrity.org/files/publications/Which_Agency_Should_Regulate_Carbon_Credits_in_the_U.S._.pdf.

[473] Jain, G., Jenarthan, P., Prado, V., & Deshmukh, S. (2026, June). *Taking Stock of the Regulatory Landscape for Project-Based Carbon Credit Markets*. Columbia Center on Global Energy Policy. https://www.energypolicy.columbia.edu/wp-content/uploads/2026/06/PCCM-CGEP_RegulatoryFramework_060226-2.pdf.

[474] Tuholjaković, L., McClure, S., & Melius, M. (2026, June). *Voluntary Carbon Markets at a Crossroads: Structural Failures and the Path to Reform*. Stanford Law School. https://law.stanford.edu/2026/06/24/voluntary-carbon-markets-at-a-crossroads-structural-failures-and-the-path-to-reform/.

# Building Government for Today





9 Government that Delivers 230



CHAPTER 9:

# Government that Delivers

## The American government must be a trusted, dependable, and effective partner for states and localities, businesses, and American families.

Full stop. Any entity interacting with the federal government should be able to do so with clarity, confidence, and certainty. From receiving the benefits one has earned, rebuilding communities after a natural disaster, providing trusted data, and delivering federal grant and loan assistance in a timely and reliable manner, we should live in a country where any party engaging with the government – be it individuals, businesses, nonprofits, and subnational governments – can do so with ease.

Frustratingly, however, businesses and communities have long-standing concerns about the federal government as this reliable partner, and these concerns have been greatly exacerbated as political shifts have become more volatile over the past decade. In particular, the federal government is increasingly perceived as an unreliable partner with which businesses, communities, and state and local governments can engage because of the volatility of policies and programs, a sense of uncertainty of the government's long-term commitment to funding, and anxiety about undertaking the bureaucratic burden of government partnerships. As a result, it has become significantly harder for entities to justify investing their time and resources into working with the federal government, despite its essential role in economic growth, as identified throughout this report.

The framework proposed here seeks to change this dynamic, reestablishing the federal government as a reliable and credible partner by increasing operational efficiency and transparency in its actions and allowing it to once again serve its essential role in driving economic growth.

**TO CREATE A THRIVING ECONOMY, THIS CHAPTER FOCUSES ON THE FOLLOWING BENCHMARKS TO SUPPORT A GOVERNMENT THAT DELIVERS:**

- **BENCHMARK #9.1:** Certainty of federal funding ensures federal grantees can make long-term investment and execution decisions. | 232
- **BENCHMARK #9.2:** Streamlined and consolidated federal processes accelerate deployment without sacrificing the health of the environment. | 235
- **BENCHMARK #9.3:** The federal government has the capacity and resources to serve as the premier and trusted partner for technical expertise, including data and analysis. | 239
- **BENCHMARK #9.4:** The federal government is fully transparent, accountable, and responsive in its engagement with all parties, from major corporations to local communities. | 242
- **BENCHMARK #9.5:** States, localities, Tribes, and territories are empowered by the federal government's resources and technical assistance. | 245

CONGRESSIONAL LEAD:

POLICY EXPERT: TIM PROFETA

# Rep. Gabe Amo

## RI–01



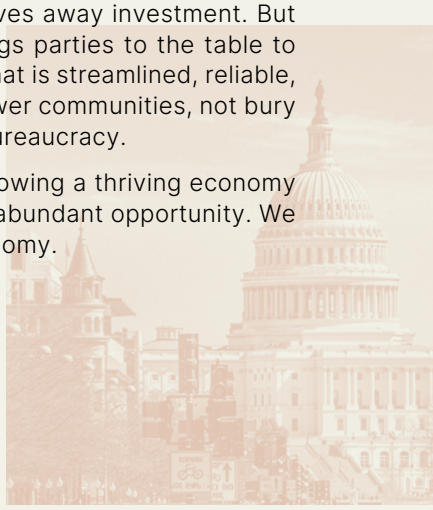
**THE AMERICAN PEOPLE NEED THEIR GOVERNMENT TO BE A RELIABLE PARTNER IN DELIVERING ON THE PROMISE OF OUR DEMOCRACY.** But all too often, it comes up short. Instead of being dependable and effective, it is unwieldy and unreliable. That's why I am proud to partner on this SEEC Institute roadmap to build a government that delivers for the American people. A government that can work hand in hand with state and local governments, nonprofits, working families, and small businesses to build a thriving economy that works for everyone.

My career has spanned two White Houses, a State House, and the United States Capitol. For former Rhode Island Governor Gina Raimondo, I coordinated with federal partners to bring home resources and funding for Rhode Islanders. Working for President Biden, I helped states, counties, cities, towns, and villages access federal funding, navigate bureaucracy, and respond to crises. At each level of government, I have seen how people's lives improve when government runs well. I have also seen the missed opportunities and communities that get left behind when the government fails to deliver.

Our country is at a crossroads, and Americans cannot afford for their government to continue missing the mark. Costs are rising, extreme weather is increasing, stratification of social and economic outcomes is growing, and partisan politics is being increasingly injected into daily government operations. The American people deserve a government that does not leave them to weather storms – both literally and figuratively – alone. They deserve a government that not only stands by them but also builds an economy where everyone can thrive.

This Thriving Economy Project chapter outlines a vision for a government that consistently delivers for all Americans, regardless of the technology being deployed or the political parties of Congress or the President. We can build a future where *government* is not a dirty word that drives away investment. But where the government is a force multiplier that brings parties to the table to invest in a better future for everyone. A government that is streamlined, reliable, and transparent. A government that is ready to empower communities, not bury them in mountains of paperwork and never-ending bureaucracy.

Together, we can create a government capable of growing a thriving economy for everyone, with lower costs, a healthy planet, and abundant opportunity. We can create a government that delivers a thriving economy.



BENCHMARK #9.1:

# Certainty of federal funding ensures federal grantees can make long-term investment and execution decisions.



**STAKEHOLDERS ACROSS INDUSTRIES AND POLITICAL AFFILIATIONS HAVE SEEN AN EROSION OF TRUST IN THE FEDERAL GOVERNMENT AS A RELIABLE CONTRACTING PARTNER, AS POLICY AND FUNDING VOLATILITY HAVE LED TO A MASSIVE SPIKE IN UNCERTAINTY WHEN IT COMES TO THE DURABILITY OF DEALINGS WITH THE GOVERNMENT.** While this challenge is problematic in the short term, the long-term ramifications have a much larger effect. One of the great advantages of blending private investment with federal funding has always been its de-risking effect and subsequent ability to crowd in additional financing behind it. But when prior commitments are reneged after a change in federal administration, private investors may rationally choose to withdraw their capital rather than take on risk vis-à-vis the government. For the American economy to thrive, Congress must restore the federal government's ability to be a predictable partner that honors its long-term promises. This section provides policy options for the following three key challenges:

1. Significant lag between authorized funding and shovels in the ground
2. Volatility in policies that impacts government funding programs
3. Slow avenues for judicial relief



**Challenge – Significant lag between authorized funding and shovels in the ground:** Federal financing programs are frequently bottlenecked by sluggish bureaucratic processes, which slow down projects designed to drive economic activity. These prolonged delays mean fewer projects hit the ground, increasing exposure to policy shifts under changing political leadership. Ultimately, this uncertainty erodes the incentive for stakeholders to pursue government partnerships in the first place.

## Policy Options:

- For designated energy and infrastructure programs, include legislative instructions requiring expedited timelines for agencies to obligate funds, paired with transparency mandates requiring recipients to report back immediately upon hitting key, Congress-enumerated milestones.
- Deploy funding fully to recipients with records of fiscal accountability, rather than retaining funds in U.S. Department of Treasury accounts.
- Deploy federal funding through trusted third-party fiscal intermediaries to allow for nimbler program management and structural insulation from political shifts. To maintain public trust and protect federal resources, such arrangements should include rigorous clear disclosure requirements as directed by Congress.

## Policy Context:

Speeding federal resources into the economy is a key priority. But equally, if not more, important is the need to provide certainty to recipients of that public investment so that they may rely on it for their own long-term investment decisions. The combination is essential to drawing private partners that will drive economic growth. As a result, the quicker that funds can be responsibly deployed and put to work, the better.

Many reviews have criticized the speed at which recent efforts at public investments have been deployed. One evaluation called on the executive branch to "deploy federal funding faster and more efficiently," and Congress to contribute by offering more "implementation-oriented policy design."[475] Another evaluation of U.S. Department of Energy (DOE) programs under the *Infrastructure Investment and Jobs Act* (IIJA) found that many "programs had not begun construction three years after that law had passed. (In one case, a DOE office expected ~75% of its projects entering construction in 2029 or [later.]"[476]

Responsibility for ensuring timely execution of appropriated funds largely lies with Congress as the branch of government tasked with the power of the purse. Congress, therefore, is fully within its power to provide specific instructions on the deployment of funding, including timing, guardrails on the eligibility of grantees, and conditions for rescission or termination. Such expedition has been proven to facilitate executive action when legislatively required, but it should be limited to particularly critical investment needs. Earlier deployment of funding to grant recipients also will increase confidence that grants will be available quickly, but it should be required selectively for recipients with long records of reliable fiscal management and accountability. Finally, there are long precedents authorizing the use of third-party fiscal agents to manage deployment of government funding in a nimbler manner, which Congress can build upon to provide confidence that funding will be available for needed investments going forward. As an example, under statutes dating back to the *National Banking Acts of 1863 and 1864*, both parties have used Financial Agency Agreements, which allow a financial institution to act as a third-party fiscal agent on behalf of the government.

**Challenge – Volatility in policies that impacts government funding programs:** Government funding programs need to be seen as durable and not subject to rescission or termination except in narrow, well-defined circumstances. Current practices risk that shifting policy priorities will disrupt federal commitments, making long-term investment planning nearly impossible.

## Policy Options:

- For high-priority energy and infrastructure programs, Congress should limit the use of termination for convenience clauses in federal funding agreements, instead providing that funding may be terminated only for cause.

## Policy Context:

Businesses, investors, and communities alike require structural stability. To ensure that electoral cycles are less likely to render the government's long-term financial commitments unreliable, Congress should implement explicit statutory

[475] Garden-Monheit, H. & Joseph, T. (2025, October). *Building a More Effective, Responsive Government: Lessons Learned from the Biden-Harris Administration*. Roosevelt Institute. https://rooseveltinstitute.org/publications/building-a-more-effective-responsive-government/.

[476] Fahs, R., Propp, A., & White, L. (2025, October). *Implementation of Federal Clean Energy: Lessons Learned from DOE and Partner Agencies*. Clean Energy Implementation Report. https://energyimplementation.github.io/.

language preventing future funding rescissions for high-priority programs except under narrow, well-defined circumstances subject to external oversight. A recent bipartisan letter from the National Governors Association (NGA) made this request explicitly of Congress, stating that Congress should "[c]odify a technology-neutral prohibition on retroactive permit or lease cancellation, amendment, or alteration."[477] To execute such an approach, future priority programs can include language such as "funds awarded under [identified programs] may not be rescinded, reprogrammed, or deferred except by law."

This legislative shield is necessary because potential recipients of federal grants and loans have voiced deep concerns about the erosion of trust in the federal government as a consistent counterparty. Long-term infrastructure and energy projects require multi-year investment and planning timelines that inherently exceed electoral cycles. While shifts in administrations and Congressional majorities naturally alter future policy goals, changes in leadership must not undercut the government's long-term obligation to stand behind its already executed commitments.

**Challenge – Slow avenues for judicial relief:** Obtaining relief in federal courts for rescinded or terminated grants and loans is delayed by jurisdictional disputes and overloaded courts. The lack of expedited legal remedies for fast-moving infrastructure projects when funding or contract disputes arise leaves recipients stuck in costly limbo.

## Policy Options:

- Establish the U.S. District Courts as the courts of primary jurisdiction over the review of inappropriately rescinded or terminated grants or loans.
- Create requirements for courts to expedite review of claims for inappropriately rescinded or terminated grants and loans.

## Policy Context:

Beyond expediting public investment and language to provide assurance that the government's word is good when contracting, expedited judicial review should be made clearly available for high-priority programs so that recipients can obtain quick and decisive relief in the event that political change threatens their government grant or loan. Recent litigation, however, has delivered anything but this kind of quick and clear relief.

Specifically, there is an expanding series of cases clarifying when a plaintiff may contest a cancellation of a grant in U.S. District Court or when they must bring that case in the U.S. Court of Federal Claims (CFC). As Justice Amy Coney Barrett wrote in her controlling opinion in *National Institutes of Health vs. American Public Health Association*, litigation about agency guidance changing the policy surrounding grants belongs in the U.S. District Court, but decisions about the terminations of specific grants is the exclusive jurisdiction of the CFC.[478] The impact of this decision leaves a complicated bifurcated process. As she explained, a plaintiff would have to sequentially sue to first overturn the guidance in a U.S. District Court, then file a second case in the CFC to get damages.[479] And the latter court cannot reinstate the grant, as the CFC does not have equitable powers.

This process not only risks leaving counterparties with partial relief but also may deter potential future partners with the government. Many counterparties likely do not have the resources or time to engage in such a lengthy process. The waiver of sovereign immunity under both the *Administrative Procedure Act* (for U.S. District litigation) and the *Tucker Act* (for CFC litigation) was defined and outlined by Congress, and Congress can act again to provide the path to expedited relief that is needed to reengage and attract future partners. **THE U.S. DISTRICT COURT SYSTEM HAS COMPARATIVELY MORE CAPACITY THAN THE CFC, AS WELL AS TRADITIONAL AFFINITY WITH THE POWERS NEEDED TO BE ABLE TO REINSTATE AND HONOR THE AGREEMENTS MADE WITH GRANT AND LOAN RECIPIENTS. CONGRESS SHOULD EMPOWER THOSE COURTS TO OVERSEE LONG-TERM GOVERNMENTAL COMMITMENTS.**

Moreover, in an increasingly stressed judicial system, Congress should also indicate a need to prioritize judicial review of federal grants and loans, with appropriate resourcing. As investment-backed expectations risk becoming moot with the delays that come from extended litigation, this may be a true case of justice delayed becoming justice denied. Congress, however, is within its power to create timeframes by which a plaintiff's claims should be adjudicated, thereby giving clear direction to litigants and judges that those claims should be swiftly resolved. This congressional intervention is particularly essential given the recent proposed rulemaking by the Office of Management and Budget (OMB) governing grant management under *2 CFR 200*, which suggests a further narrowing of judicial oversight and remedies.[480]

[477] National Governors Association. (2025, October). *NGA Letter on Energy Permitting Priorities*. https://www.nga.org/advocacy-communications/letters-nga/nga-letter-on-energy-permitting-priorities/.

[478] NATIONAL INSTITUTES OF HEALTH, ET AL. v. AMERICAN PUBLIC HEALTH ASSOCIATION, ET AL., 606 U.S. ___ (2025). https://www.supremecourt.gov/opinions/24pdf/25a103_kh7p.pdf.

[479] NATIONAL INSTITUTES OF HEALTH, ET AL. v. AMERICAN PUBLIC HEALTH ASSOCIATION, ET AL., 606 U.S. ___ (2025). https://www.supremecourt.gov/opinions/24pdf/25a103_kh7p.pdf.

[480] Proposed Rule: Regulation for Federal Financial Assistance, 91 Federal Register 32198 (2026). https://www.federalregister.gov/documents/2026/05/29/2026-10817/regulation-for-federal-financial-assistance.

BENCHMARK #9.2:

# Streamlined and consolidated federal processes accelerate deployment without sacrificing the health of the environment.



**TO TRULY CREATE A GOVERNMENT THAT DELIVERS, WE MUST ADDRESS THE BUREAUCRATIC HURDLES REQUIRED TO ENGAGE WITH THE GOVERNMENT AND HOW THEY IMPEDE FULLER PARTNERSHIPS.** Many government processes are overly complex and result in delays. Simply put, the government must be able to act more quickly. This section provides policy options for four key challenges:

1. Delayed permitting processes
2. No centralized administrator of federal financing authorities
3. No coordinated strategy to build climate resilience
4. Legacy and time-consuming procedural barriers



**Challenge – Delayed permitting processes:** Federal permitting processes delay both the energy and infrastructure investments sorely needed under existing law and those that are detailed throughout this report.[481]

## Policy Options:

- Establish consistent and technology-neutral permitting processes across energy technologies. Prohibit different treatment of permitting processes for different technologies.
- Allow expedited consideration of challenges to already permitted projects while retaining third-party voices and ability to sue.
- Centralize permitting processes within the Executive Office of the President (EOP) and have a transparent timeline for decision-making.
- Require the adoption of common interagency digital systems, ePermitting, and common application formats.

## Policy Context:

We are in a defining moment of energy affordability, with demand for energy spiking as supply remains stable or even retracts. Getting more energy to our grid, which requires building out new, clean, cheaper sources of power to drive economic growth, is a national priority. Federal processes should support getting clean energy, transmission, and storage to the grid, especially as they are generally lower cost, quicker to deploy, and less exposed to fuel price volatility. Ensuring that permitting processes allow the quick deployment of resources is in the interest of the economy and the environment. Federal permitting processes, especially those under the *National Environmental Policy Act* (NEPA), are widely acknowledged to be a key source of delay in federally supported investments. There is overwhelming interest in reform of these processes.

Such reform must follow some core principles. First, it must undeniably treat all industries and project types equivalently. Recent political changes have led to the use of permitting processes to selectively slow, suspend, or shut down certain projects, while other sectors of the economy have benefited from much greater expedition. Any reform must ensure that all types of projects are treated equivalently, from the security of their place in the queue, to the review criteria applied, to the level of approval needed to grant the permit.

Second, reform must not eliminate third-party voices in the permitting process. On the contrary, engagement with impacted stakeholders, especially host communities, is essential to ensure the efficient consideration of a permit and should be frontloaded in the process, as early discussion helps shape proposals so they acquire stakeholder endorsement. Congressional proposals for permitting reform might choose to require that all permit applications disclose such early engagement, and any modifications made to account for it, before the permitting deadlines are set.

Third, reform must respect the role of states and Tribes in the process. State and Tribal governments are key trustees for their natural resources, and no reform should override their right to protect the natural resources they oversee.

Finally, reform should identify a centralized authority over the permit processes within the EOP to increase transparency and ensure efficient processing of permits. The Fast 41 Dashboard of the U.S. Department of Transportation (DOT) is a positive precedent, but a truly centralized manager will need to be able to coordinate across departments with different mandates and internal bureaucracies, such as the U.S. Department of Defense (DOD) and U.S. Department of the Interior (DOI).

## 4 Core Principles

**FEDERAL PERMITTING PROCESSES SHOULD FOLLOW:**

**1** **IT MUST UNDENIABLY TREAT ALL INDUSTRIES AND PROJECT TYPES EQUIVALENTLY.**

**2** **REFORM MUST NOT ELIMINATE THIRD-PARTY VOICES IN THE PERMITTING PROCESS.**

**3** **REFORM MUST RESPECT THE ROLE OF STATE AND TRIBES IN THE PROCESS.**

**4** **REFORM SHOULD IDENTIFY A CENTRALIZED AUTHORITY OVER THE PERMIT PROCESSES.**

[481] Advocates across the political spectrum are currently arguing for a reform in the permitting systems to build much of the new infrastructure described throughout this report.

**Challenge – No centralized administrator of federal financing authorities:** With a patchwork of financing programs spread across numerous federal agencies, coordination often falls to the White House. While proximity to key decisionmakers arguably may be helpful, the lack of expertise limits effectiveness.

## Policy Options:

- Create a centralized office with a broad mandate to coordinate federal infrastructure and energy financing programs under a shared-governance model, empowering it to streamline processes and align risk tolerance across agencies.

## Policy Context:

Currently, 19 domestically focused financing programs are scattered across seven agencies. Historically, the EOP has attempted to fill this coordination role through its councils and task forces. However, the EOP tends to lack the deep institutional capacity required to manage often intricate operational details of federal clean energy programs and funding processes, and relying on White House-led bodies inherently increases the risk that funding strategies will not outlast an election cycle.

Congress should address this fragmentation by creating a permanent, centralized coordinating office. This office will provide a consistent, comprehensive evaluation experience for stakeholders, generate a more holistic government-wide view of risk tolerance as discussed in Chapter 8: Accessible, Low-Cost Finance for a Clean Energy Future, and align goals. It will also match potential partners with the precise tools and technical assistance needed during the application process. By centralizing risk evaluation and leveraging shared subject matter expertise, this office can align fractured federal programs toward long-term national policy objectives, providing greater consistency and certainty in policy.

**Challenge – No coordinated strategy to build climate resilience:** No durable, statutory framework currently requires federal agencies to align their resilience-related programs, investments, and guidance around a common national strategy.

## Policy Options:

- Establish a National Resilience Strategy in statute, grounded in the Federal Emergency Management Agency's (FEMA) National Resilience Guidance, to articulate national resilience policy and priorities and require that federal doctrine, strategy, policy, practice, and investment are aligned and consistent.
- Direct federal agencies to harmonize their resilience-related programs, grant requirements, and eligibility standards around a shared framework.
- Increase federal support for state offices of resilience that help under-resourced communities plan and implement projects and invest in data, staffing, and governance systems at state and local levels.
- Require federal agencies to incorporate community partnerships into program design and technical assistance, enabling states, local governments, Tribes, and territories to assess their current resilience capacity, identify gaps, and access targeted federal support to advance along a structured, evidence-based pathway toward integrated resilience governance.[482]

## Policy Context:

Economic vitality depends on ensuring that the United States, and its infrastructure and ecosystems, are resilient to the coming challenges of climate change. Unfortunately, federal resilience policy is fragmented across more than 30 agencies with inconsistent eligibility standards, competing program requirements, and no unified strategic framework to coordinate action or signal national priorities.[483] This misalignment imposes excessive administrative burdens on states, local governments, Tribes, and territories; slows delivery of resilience investments to the households and communities that need them most; and reduces the return on federal spending. Consumers and communities bear the cost of this dysfunction through delayed recovery, duplicative compliance requirements, and federal programs that fail to reinforce one another.

Congress should require a more coordinated approach to the resilience challenge. For example, the *National Resilience Strategy* released in January 2025 articulated a comprehensive framework to the challenge organized around four pillars – Governance, Social and Community, Economic, and Infrastructure – and emphasized that national resilience depends on

[482] Federal Emergency Management Agency. (2024, August). *National Resilience Guidance: A Collaborative Approach to Building Resilience*. https://toolkit.climate.gov/tool/fema-national-resilience-guidance-collaborative-approach-building-resilience.

[483] United States Government Accountability Office. (2022, November). *Disaster Recovery: Actions Needed to Improve the Federal Approach*, GAO-23-104956. https://www.gao.gov/products/gao-23-104956.

the stability and continuity of states, local governments, Tribes, and territories, working in partnership with federal agencies.[484] FEMA's National Resilience Guidance, finalized in August 2024 but withdrawn in March 2025, translates that vision into actionable guidance, establishing a unifying definition of resilience, a community resilience maturity model, and the principle that "[a] resilient nation is created and sustained through thriving communities with secure and adaptable social, economic, environmental, housing, infrastructure, and institutional systems."[485] Both frameworks underscore that addressing resilience from any single perspective or through any one program will not be sufficient.

Yet the current federal approach remains structurally fragmented, a condition GAO has identified as diminishing service delivery to disaster survivors and communities, exposing federal programs to waste, and reducing the effectiveness of recovery efforts.[486] This fragmentation falls hardest on communities with the least institutional capacity– including rural jurisdictions, Tribal Nations, and lower-income communities – that cannot afford the staff, legal, and technical resources needed to navigate multiple federal programs simultaneously. For the families in these communities, the cost is concrete: delayed rebuilding, foregone mitigation, and repeated exposure to losses that a more coherent federal system could have helped prevent.

**A STATUTORY NATIONAL RESILIENCE STRATEGY – GROUNDED IN EXISTING FEDERAL GUIDANCE, COORDINATED ACROSS AGENCIES, AND ORIENTED AROUND THE STATES, LOCAL GOVERNMENTS, TRIBES, AND TERRITORIES BEST POSITIONED TO LEAD LOCAL IMPLEMENTATION – CAN CONVERT THE ASPIRATIONAL FRAMEWORKS ALREADY DEVELOPED BY FEMA AND THE BROADER FEDERAL GOVERNMENT INTO DURABLE POLICY THAT DELIVERS FOR HOUSEHOLDS AND COMMUNITIES.**

**Challenge – Legacy and time-consuming procedural barriers:** Many of the procedural statutes in the federal code were written decades ago, and both Congress and prior Administrations have failed to update them accordingly.

## Policy Options:

- Initiate cleanup of outdated, vestigial, conflicting, and de minimis statutes.
- Reduce outdated requirements in the *Paperwork Reduction Act* (PRA).

## Policy Context:

Example after example exists of government officials who are delayed in delivering because of complex and comprehensive statutory and regulatory requirements that serve as a precondition of action. While grounded in justifiable policy obligations at the time of adoption, the pure weight of collective bureaucratic obligations, and the lack of updates to many of these statutes to match a modern economy, has greatly slowed the government's abilities to provide the services that are most needed in a timely and effective way.

For example, the PRA was originally created and implemented in 1980, well before the digital economy. The law requires that any effort to collect information to inform government action from 10 or more persons or entities must first receive clearance from OMB. With nearly 50 years of interpretations and guidance built up over time, the PRA has required an average of nine months of process before such inquiries can even be made.[487] Congress should update the PRA to reflect the practices of the digital era, making clear that practices to improve the user experience – such as testing the usability and accessibility of websites or obtaining data about the users' usage – are not subject to PRA approval.

Beyond the PRA, many other federal requirements and processes make it difficult for government programs to deliver quickly and efficiently. Most of these rules were created for legitimate reasons and reflect important public concerns, so reforms should be approached carefully. A well-resourced review should identify outdated, duplicative, conflicting, or de minimis requirements and recommend ways to streamline them while preserving the core protections and public benefits they were intended to provide.




[484] The White House. (2025, January). *National Resilience Strategy*. https://bidenwhitehouse.archives.gov/wp-content/uploads/2025/01/National-Resilience-Strategy.pdf.

[485] Federal Emergency Management Agency. (2024, August). *National Resilience Guidance: A Collaborative Approach to Building Resilience*. https://toolkit.climate.gov/tool/fema-national-resilience-guidance-collaborative-approach-building-resilience.

[486] United States Government Accountability Office. (2022, November). *Disaster Recovery: Actions Needed to Improve the Federal Approach*, GAO-23-104956. https://www.gao.gov/products/gao-23-104956.

[487] Mechanick, A. (2025, April). *How to Fix the Paperwork Reduction Act*. Niskanen Center. https://www.niskanencenter.org/how-to-fix-the-paperwork-reduction-act/.

BENCHMARK #9.3:

# The federal government has the capacity and resources to serve as the premier and trusted partner for technical expertise, including data and analysis.



**THE GOVERNMENT WILL ACHIEVE THE GOALS OF THIS REPORT ONLY IF IT HAS SUFFICIENT RESOURCES AND QUALITY STAFF TO EXECUTE THEM.** This challenge is acute in the current moment, as the federal workforce has been dramatically downsized and morale amongst the workforce is at historic lows.

To meet the moment, Congress should create a federal personnel system that is simpler, faster, and more flexible, allowing agencies to recruit talent quickly and manage teams effectively. It must also modernize the government's digital tools to embrace new technological advancements to execute on policy more efficiently and effectively. This section provides policy options for two key challenges:

1. An emaciated federal workforce capacity
2. Antiquated digital infrastructure



**Challenge – An emaciated federal workforce capacity:** The federal government has a dearth of capacity to execute the demands of the current moment and the priorities in this report.

## Policy Options:

- Utilize the partnership capability of federally funded research and development centers, the *Intergovernmental Personnel Act* (IPA), and Special Government Employees.
- Expand the IPA to allow targeted private sector participation in target areas such as energy and artificial intelligence (AI).
- Enhance recruitment and personnel management while still hewing to Merit System Principles.

## Policy Context:

The list of under-resourced government functions to execute priorities spreads across the entire government. The scientific backbone of departments and agencies needed to assess technologies and investments has been greatly weakened. The staff needed to provide the speed of adjudication for permits are sparse when they may be asked to increase their speed. In the end, we need to ensure that the government has the human capital to execute on ambitious policy ideas. Such reform must be a priority if the government is to deliver.

As a first effort, Congress can quickly encourage the use of authorities to bring a new surge of talent to the challenge. The federal government already possesses multiple authorities to quickly recruit and install talented staff to execute its priorities. In particular, programs such as the IPA and Special Government Employee designation allow the government to build expert capacity by drawing in temporary appointees from state and local governments, universities, nongovernmental organizations, and the private sector. Congress can and should encourage their use, providing direction and explicit funding for the government to use these avenues to resource particular programs. For priority areas, Congress can also broaden the authorities. For example, the IPA does not allow participation from private sector employees who might possess some of the most relevant knowledge on the deployment of investment. For targeted areas such as infrastructure engineering and clean energy, Congress should consider expanding the IPA's authority to allow private sector participation, subject to appropriate guardrails and conflict of interest protections for the public.

To truly address the staffing needs of the government, however, reform of the federal government's hiring and firing processes is needed. The system must retain the Merit System Principles that undergird our hiring processes, valuing integrity, performance accountability, and workforce efficiency.[488]

However, the management processes that have arisen under these principles have diverged from their core intent. For example, to prevent cronyism and nepotism, hiring screening is done via self-assessment questionnaires and a generalist Human Resources (HR) resume review that forecloses input from the very personnel that listed the position. In the process, no independent effort is made to ensure the candidates possess the skills advertised. As a result, only 51% of job postings result in a job offer, woefully missing the efficiency of recruitment needed in this moment.[489]

To truly address the staffing needs of the government, however, reform of the federal government's hiring and firing processes is needed. The system must retain the Merit System Principles that undergird our hiring processes, valuing integrity, performance accountability, and workforce efficiency.

Performance management is also suffering, yet it is just as important for employees to perform well as it for their roles to be filled. The best solution for ensuring adequate performance is to hire the right person in the first place. According to a Merit System Protection Board study, "the two factors that supervisors perceived as playing the greatest role in performance deficiencies were: (1) the employee's disinterest in doing the necessary work to succeed; and (2) the employee not being suited for that particular job." The same report detailed a list of approaches to improve performance, including supervisors that reported a host of time-intensive efforts to improve performance that were effective in under 50% of cases. When asked if they were confident that they could remove an underperforming employee, only 41% said they were confident if there was serious misconduct and 26% were confident if there was seriously deficient performance.[490]

Finally, the Office of Personnel Management (OPM) and individual HR departments must become better strategic partners in the recruitment process. OPM is often seen as preventing departments and agencies from hiring the employees that they have labored months to recruit. Reform should delegate more authority and responsibility to the departments and agencies themselves for complying with Merit System Principles, enabling nimble alignment with department and agency goals. And in the department and agencies themselves, HR offices must become more of a partner with the teams recruiting employees, allowing the latter the power to identify, evaluate, and select the appropriate candidates.

[488] 5 U.S.C. Sec. 2301. https://uscode.house.gov/view.xhtml?req=granuleid:USC-1999-title5-section2301&num=0&edition=1999.

[489] Pahlka, J. & Greenway, A. (2024, December). *The How We Need Now: A Capacity Agenda for 2025 and Beyond*. https://www.niskanencenter.org/wp-content/uploads/2024/12/Niskanen-State-Capacity-Paper_-Jen-Pahlka-and-Andrew-Greenway-2.pdf.

[490] United States Merit Systems Protection Board. (2019, June). *Remedying Unacceptable Employee Performance in the Federal Civil Service*. www.mspb.gov/studies/publications/Remedying_Unacceptable_Employee_Performance_in_the_Federal_Civil_Service.pdf.




**Challenge – Antiquated digital infrastructure:** The government's digital and data infrastructure is outdated and unable to keep up with needed services.

## Policy Options:

- Transition government digital infrastructure efforts to a product operating model.
- Invest in common platforms across government functions.

## Policy Context:

The federal government is too often operating with outdated systems and processes while trying to serve a modern, digital economy. At the same time, new technologies are making it easier than ever to improve efficiency, reduce delays, and deliver services more effectively. Government should take advantage of these advances. Past investments in organizations such as the U.S. Digital Service (USDS) have generated significant returns by helping agencies modernize operations and avoid costly mistakes. Continued investments in digital capacity can deliver similar benefits in the future.

**TO INCREASE THE FEDERAL GOVERNMENT'S DIGITAL CAPACITY AND COMPETENCE, NEW INVESTMENT IS NEEDED, AND SHOULD BE AUTHORIZED BY CONGRESS TO PROVIDE PLATFORMS FOR PROCESSING APPLICATIONS AND NECESSARY PERMITTING. HOWEVER, THE CREATION OF NEW, EFFECTIVE DIGITAL SERVICES LIKELY REQUIRES A CHANGE IN THE MODEL FOR THEIR DEVELOPMENT, EVOLVING FROM A TRADITIONAL PROJECT-SPECIFIC MODEL FOCUSED ON PROJECT TIMELINES AND ON-BUDGET DELIVERY TO A PRODUCT OPERATING MODEL FOCUSED ON OUTCOMES AND AIMED AT AN ADAPTIVE AND ITERATIVE PROCESS TO CONTINUALLY UPDATE THE DIGITAL SERVICE TO DELIVER ON THOSE OUTCOMES.** This product operating model mirrors the development processes of the world's most successful technology firms to ensure they develop services most in keeping with their users' needs.[491]

Moving to a product operating model requires shifts in culture, regulation, and resources. OMB and individual agencies must change evaluation of digital teams' performance to value the creation of the iterative learning efforts of the product model, and legislation to create such efforts must shift evaluation criteria to value such a model. Moreover, funding to support the transition to a product operating model should be provided, particularly in appropriations to centralized offices, such as the USDS and the Technology Transformation Service (TTS), that can partner with individual teams in agencies to advocate for product operating model approaches. The Technology Modernization Fund also exists as an underfunded vehicle to drive investment for updating the digital services of the government.

In addition to a change in model, the government will also benefit from efforts to consolidate platforms across government departments and agencies to eliminate inefficiencies and redundancies. The United States has made some progress in this direction, adopting platforms like login.gov that allows citizens to access multiple government sites through one platform. However, there are examples across the government of individual teams' repeatedly reinventing the same product. Funding the centralized technology offices for the government to provide the platforms and data infrastructure that undergird many government products will speed the delivery of those services.

[491] Lewis, A. & Pahlka, J. (2025, July). *The Product Operating Model: How Government Should Deliver Digital Services*. Niskanen Center. https://www.niskanencenter.org/the-product-operating-model-how-government-should-deliver-digital-services.

**BENCHMARK #9.4:**

# The federal government is fully transparent, accountable, and responsive in its engagement with all parties, from major corporations to local communities.



**ENGAGEMENT AND TRANSPARENCY ARE VITAL TO ENSURING THAT FEDERAL POLICY ACHIEVES THE DESIRED BENEFITS.** Shining light on government activities helps to control for potential abuses and will enable greater buy-in from the public. Providing clarity on decision-making and increasing the ability for engagement will also help build trust in private-public partnerships. This section provides policy options for two key challenges:

1. Implementation delays caused by unclear legislative text
2. Engaging the government is too complicated



## Challenge – Implementation delays caused by unclear legislative text:

The lack of sufficient clarity in legislative text makes interfacing with the government difficult given uncertainties about government programs.

## Policy Options:

- Include timelines for agencies to release rules and guidance in a passed bill whenever possible.
- Codify into law the principles of *Chevron* deference.

## Policy Context:

There are many instances when the federal government enacts legislation with ambiguous language, requiring agencies to then issue guidance clarifying the statute's meaning for all stakeholders. As Congress has increasingly relied on budget reconciliation procedures, this challenge has intensified because the *Budget Act* limits the amount of policy context that can be included in reconciliation legislation. For example, in the latest reconciliation legislation, the *One Big Beautiful Bill Act* (OBBBA), the provisions expanding the Foreign Entity of Concern (FEOC) rules governing federal energy tax credits took effect in the beginning of 2026. However, the law's broad language created significant uncertainty: businesses and investors were unable to determine whether particular investments would qualify for tax credits, and the Internal Review Service (IRS) and the Treasury Department did not issue interim guidance until eight months later.

To address these issues, the most effective solution is for Congress to provide clearer direction within the text of legislation itself, enabling private parties to confidently engage with federal programs from day one. Where that is not feasible because of procedural rules or other legislative constraints, Congress should explicitly require agencies to issue all associated regulations and guidance within specified statutory deadlines.

Finally, to empower agencies to provide transparent and reliable guidance when implementing ambiguous statutes, Congress should pass legislation to override the Supreme Court's 2024 decision in *Loper Bright Enterprises v. Raimondo*[492] and restore the long-standing principles of judicial review established by *Chevron U.S.A., Inc. v. Natural Resources Defense Council, Inc.*[493] Under Chevron, courts generally deferred to an agency's reasonable interpretation of ambiguous statutory language in laws that the agency administers. *Loper Bright* overturned that longstanding precedent, holding that courts will no longer defer to agency expertise. For regulated parties, this shift has created significant policy uncertainty: even after an agency issues clarifying regulations or guidance, businesses and investors cannot be confident that those interpretations will survive judicial review. To restore the predictability necessary for long-term planning and investment decisions, Congress should reestablish an appropriate level of judicial deference to reasonable agency interpretations. A clear legislative restoration of the core *Chevron* framework will accomplish that.




[492] *Loper Bright Enterprises v. Raimondo*, 144 S. Ct. 2244 (2024). https://www.supremecourt.gov/opinions/23pdf/22-451_7m58.pdf.

[493] *Chevron U.S.A., Inc. v. Natural Resources Defense Council, Inc.*, 467 U.S. 837 (1984). https://supreme.justia.com/cases/federal/us/467/837/.

## Challenge – Engaging the government is too complicated: Engagement with policy developments is dominated by concentrated special interests, and avenues to provide feedback and access guidance are outdated and hard to use.

### Policy Options:

- Update government engagement websites to enable all parties to share their opinions and access resources.
- Adopt the use of more flexible opportunities like listening sessions, open-ended comment dockets, and user research strategies.

### Policy Context:

"Policymaking without strong public engagement and movement power behind it is often a fool's errand."[494] Gaining strong and diverse public support for policies requires a transparent and open dialogue regarding the effort. These discussions can begin with Congress but also must proceed with the creation of regulations and guidance from the Executive Branch.

The most common way for the public to interact with the federal government is through public comment periods on proposed guidelines for policy, Requests for Information (RFIs), and other similar engagement opportunities. Such requests, however, can be bureaucratic, complex, and dependent on outdated websites. They should be simpler, more efficient, and reliant on up-to-date technology. For example, improvements to the core interface with regulatory actions on regulations.gov should include more user-friendly interfaces and plain-language summaries, which could lead to more, and possibly higher quality, input.[495]

Moreover, Congress should provide resources and authorization to allow less formal avenues for input that can create a more sustained, two-way engagement with the public.[496] **CLEAR CONGRESSIONAL AUTHORIZATION TO CONDUCT GREATER INFORMAL ENGAGEMENT WITH COMMUNITIES, ACCOMPANIED WITH THE RESOURCES TO DO SO, WILL GREATLY ENHANCE THE TRANSPARENCY AND RESPONSIVENESS OF FEDERAL POLICY TO THE CITIZENS IT IS INTENDED TO BENEFIT.**

[494] Garden-Monheit, H. & Joseph, T. (2025, October). *Building a More Effective, Responsive Government: Lessons Learned from the Biden-Harris Administration*. Roosevelt Institute. https://rooseveltinstitute.org/publications/building-a-more-effective-responsive-government/..

[495] Sant'Ambrogio, M. & Staszewski, G. (2018, November). *Public Engagement with Agency Rulemaking - Final Report for the Administrative Conference of the United States*. Administrative Conference of the United States. https://www.acus.gov/sites/default/files/documents/Public%20Engagement%20in%20Rulemaking%20Final%20Report.pdf.

[496] Garden-Monheit, H. & Joseph, T. (2025, October). *Building a More Effective, Responsive Government: Lessons Learned from the Biden-Harris Administration*. Roosevelt Institute. https://rooseveltinstitute.org/publications/building-a-more-effective-responsive-government/.

BENCHMARK #9.5:

# States, localities, Tribes, and territories are empowered by the federal government's resources and technical assistance.



**A ROBUST PARTNERSHIP BETWEEN THE FEDERAL GOVERNMENT AND ITS STATE, LOCAL, TRIBAL, AND TERRITORIAL COUNTERPARTS IS AN ESSENTIAL STRUCTURE TO ADVANCE NATIONAL PRIORITIES IN WAYS THAT REFLECT THE ON-THE-GROUND NEEDS AND AMBITIONS BEST UNDERSTOOD BY LOCAL LEADERS.** The federal government's actions must both empower the leadership of these governing partners and ensure they have the resources to execute on new mandates. This section provides policy options for one key challenge:

1. Lack of resources and capacity in subnational governments that blunts the impact of federal programs



**Challenge – Lack of resources and capacity in subnational governments that blunts the impact of federal programs:** State, local, Tribal, and territorial governments do not have the resources or authorities to fully execute on federal policy and do so in a manner tailored to their individual circumstances.

## Policy Options:

- Expand investment in key state block grant programs such as the State and Tribal Assistance Grant (STAG) and Transportation Implementation Plan (TIP) grants.
- Reappropriate significant funding to section 137 of the *Clean Air Act* to drive more greenhouse gas (GHG) abatement under state, local, and Tribal direction.

## Policy Context:

Greater investment through state, local, Tribal, and territorial governments provides both a more durable pathway for policy, as the constituencies have more of a stake in the execution of programs, and enhances their capability to craft programs aligned with their local needs and interests of their populations.

Congress has authorized many programs to expand the federal government's partnership with states. Specifically, DOT's TIP and EPA's STAG programs were designed to resource infrastructure and regulatory efforts at the state level and can be used to implement many of the priorities described in this report. Strong and healthy grants through such programs will help strengthen the state-federal partnership.

One program that serves as a model to be expanded is the Climate Pollution Reduction Grant (CPRG) program created under Section 137 of the *Clean Air Act*. This program has deployed $5 billion to states, localities, and Tribes to help them plan GHG reduction efforts that aligned with their local economic interests and then implement those plans. Utilizing limited federal dollars, 45 states and hundreds of municipalities and Tribes developed actionable plans to tackle pollution within their own jurisdictions. The plans were then used to apply for additional federal funding to implement these ideas. With roughly $4.5 billion available for implementation, the program was overloaded with proposals requesting over $30 billion. Reinvesting in the Section 137 program, can serve as a quick and efficient means of providing resources to, and empowering, subnational partners.

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# Acronyms

- ACRS: Advisory Committee on Reactor Safeguards
- ADA: Americans with Disabilities Act
- ADVANCE Act: Accelerating Deployment of Versatile, Advanced Nuclear for Clean Energy Act
- AgARDA: Agriculture Advanced Research and Development Authority
- AHMR: Abandoned Hardrock Mine Reclamation
- AI: Artificial Intelligence
- AIP: Airport Improvement Plan
- ANCD: Assistant National Cyber Director
- ANCHOR: Alliance of National Councils for Homeland Operational Resilience
- AOR: Area of Responsibility
- APH: Actual Production History
- ARC: Agriculture Risk Coverage
- ARC: Appalachian Regional Commission
- ARPA-E: Advanced Research Projects Agency-Energy
- ARS: Agricultural Research Service
- ATVM: Advanced Technology Vehicles Manufacturing
- AV: Autonomous Vehicle
- AVC: Animal-Vehicle Collision
- B&I: Business and Industry Loan Guarantee Program
- bcm: billion cubic meters
- BEA: Bureau of Economic Analysis
- BEAD: Broadband Equity, Access, and Deployment
- BHWET: Behavioral Health Workforce Education and Training Program
- BIA: Bureau of Indian Affairs
- BIE: Bureau of Indian Education
- BLM: Bureau of Land Management
- BLS: Bureau of Labor Statistics
- BRACE: Building Resilience Against Climate Effects
- BRIC: Building Resilient Infrastructure and Communities
- BTFA: Bureau of Trust Funds Administration
- C&M: Connect-and-manage
- CAISO: California Independent System Operator
- CalFIRE: California Department of Forestry and Fire Protection
- CARES Act: Coronavirus Aid, Relief, and Economic Security Act
- CBA: Community Benefits Agreement
- CBAM: Carbon Border Adjustment Mechanism
- CBO: Congressional Budget Office
- CBRA: Coastal Barrier Resource Act
- CBRS: Coastal Barrier Resource System
- CCA: Community Choice Aggregator
- CCDF: Childcare Development Fund
- CCP: Crisis Counseling Assistance and Training Program
- CCS: Carbon Capture and Sequestration
- CDBG: Community Development Block Grant
- CDBG-DR: Community Development Block Grant-Disaster Recovery
- CDBG-MIT: Community Development Block Grant-Mitigation
- CDC: Centers for Disease Control and Prevention
- CDF: Critical Defense Facility
- CDFI: Community Development Financial Institution
- CDR: Carbon Dioxide Removal
- CDRZ: Community Disaster Resilience Zones
- CESER: Cybersecurity, Energy Security, and Emergency Response
- CFC: Court of Federal Claims
- CfD: Contracts for Difference
- CFFM: Center for Farm Financial Management
- CFIUS: Committee on Foreign Investment in the United States
- CFPB: Consumer Financial Protection Bureau
- CFRC: Climate-related Financial Risk Committee
- CFTC: Commodity Futures Trading Commission
- CIAC: Contribution in Aid of Construction
- CISA: Cybersecurity and Infrastructure Security Agency
- CITAP: Coordinated Interagency Authorizations and Permits
- CMS: Centers for Medicare & Medicaid Services
- $CO_2$: Carbon Dioxide
- CPI: Consumer Price Index
- CPRG: Climate Pollution Reduction Grants
- CRA: Congressional Review Act
- CRADA: Cooperative Research and Development Agreement
- CREZ: Competitive Renewable Energy Zones
- CRP: Conservation Reserve Program
- CRS: Congressional Research Service
- CSC: Cyberspace Solarium Commission
- CSP: Conservation Stewardship Program
- CTA: Conservation Technical Assistance
- CW: Clean Water
- CWPP: Community Wildfire Protection Plan
- CWSRF: Clean Water State Revolving Fund
- CZMA: Coastal Zone Management Act
- DAC: Direct Air Capture
- DARPA: Defense Advanced Research Projects Agency
- DBAN: Distressed Borrowers Assistance Network
- DCEI: Defense Critical Electric Infrastructure

- DCFC: Direct Current Fast Charging
- DER: Distributed Energy Resources
- DERMS: Distributed Energy Resource Management Systems
- DFC: U.S. International Development Finance Corporation
- DNSA: Deputy National Security Advisor
- DOD: U.S. Department of Defense
- DOE: U.S. Department of Energy
- DOI: U.S. Department of the Interior
- DOJ: U.S. Department of Justice
- DOL: U.S. Department of Labor
- DOT: U.S. Department of Transportation
- DPA: Defense Production Act
- DRA: Delta Regional Authority
- DRC: Democratic Republic of the Congo
- DRECP: Desert Renewable Energy Conservation Plan
- DRF: Disaster Relief Fund
- DSCA: Defense Support of Civil Authorities
- DW: Drinking Water
- DWSRF: Drinking Water State Revolving Fund
- E-ISAC: Electricity Information Sharing and Analysis Center
- EAC: Electricity Advisory Committee
- EarthMRI: Earth Mapping Resource Initiative
- EAS: Essential Air Service
- EDA: Economic Development Administration
- EDF: Office of Energy Dominance Financing
- EIA: Energy Information Administration
- EIR: Energy Infrastructure Reinvestment
- EITI: Extractive Industries Transparency Initiative
- ELC: Epidemiology and Laboratory Capacity
- EMPG: Emergency Management Performance Grant
- E.O.: Executive Order
- EOP: Executive Office of the President
- EPA: Environmental Protection Agency
- EPR: Extended Producer Responsibility
- EQIP: Environmental Quality Incentives Program
- ERCOT: Electric Reliability Council of Texas
- ERS: Economic Research Service
- ESA: Endangered Species Act
- ESCC: Electricity Subsector Coordinating Council
- ESTH: Environment, Science, Technology, and Health
- ETA: Employment and Training Administration
- ETAC: Energy Threat Analysis Center
- EU: European Union
- EUMR: EU Methane Regulation
- EV: Electric Vehicle
- EXIM: Export-Import Bank
- FAA: Federal Aviation Administration
- FAC: Federal Advisory Committee
- FAIR Plan: Fair Access to Insurance Requirements Plan
- FBI: Federal Bureau of Investigation
- FCC: Federal Communications Commission
- FCS: Foreign Commercial Service
- FCSM: Federal Commission on Statistical Methodology
- FDA: U.S. Food and Drug Administration
- FDIC: Federal Deposit Insurance Corporation
- FEMA: Federal Emergency Management Agency
- FEOC: Foreign Entity of Concern
- FERC: Federal Energy Regulatory Commission
- FESI: Foundation for Energy Security and Innovation
- FFAR: Foundation for Food and Agriculture Research
- FHA: Federal Housing Administration
- FHFA: Federal Housing Finance Agency
- FHWA: Federal Highway Administration
- FIO: Federal Insurance Office
- FMA: Flood Mitigation Assistance
- FMAG: Fire Management Assistance Grants
- FOIA: Freedom of Information Act
- FORGE: Forum on Resource Geostrategic Engagement
- FPIC: Free, Prior, and Informed Consent
- FSA: Farm Service Agency
- FSFL: Farm Storage Facility Loan Program
- FSO: Foreign Service Officer
- FSOC: Financial Stability Oversight Council
- FTA: Federal Transit Administration
- FTC: Federal Trade Commission
- FWS: U.S. Fish and Wildlife Service
- FY: fiscal year
- GAO: U.S. Government Accountability Office
- GBA: Global Battery Alliance
- GBAM: Greenhouse Gas Border Adjustment Mechanism
- GDP: Gross Domestic Product
- GHG: Greenhouse Gas
- GHGRP: Greenhouse Gas Reporting Program
- GLO: Get the Lead Out
- GRIP: Grid Resilience and Innovation Partnerships
- GSA: General Services Administration
- GSE: Government Sponsored Enterprise
- GW: Gigawatt
- H+T: Housing + Transportation
- H2Hubs: Regional Clean Hydrogen Hubs
- HA/DR: Humanitarian Assistance / Disaster Response
- HBOM: Hardware Bill of Materials

- HHS: U.S. Department of Health and Human Services
- HIP: Housing Improvement Program
- HMGP: Hazard Mitigation Grant Program
- HR: Human Resources
- HRSA: Health Resources and Services Administration
- HSA: Health Savings Account
- HSI: Hispanic-Serving Institutions
- HUD: U.S. Department of Housing and Urban Development
- HUD-VASH: Veteran Affairs Supportive Housing
- HVAC: Heating, Ventilation, and Air Conditioning
- HVDC: High Voltage Direct Current
- I-Bank: California Infrastructure and Economic Development Bank
- IAC: Investment Advisory Council
- IBHS: Insurance Institute for Business & Home Safety
- IC: Intelligence Community
- ICC: Increased Cost of Compliance
- ICDBG: Indian Community Development Block Grant
- ICS: Industrial Control Systems
- ICTS: Information and Communications Technology and Services
- IEA: International Energy Agency
- IFC: International Finance Corporation
- IG: Inspector General
- IGF: Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development
- IHBG: Indian Housing Block Grant
- IHP: Individuals and Households Program
- IHS: Indian Health Service
- IIJA: Infrastructure Investment and Jobs Act
- IMF: International Monetary Fund
- IPA: Intergovernmental Personnel Act
- IPM: Integrated Pest Management
- IRA: Inflation Reduction Act
- IRC: Internal Revenue Code
- IRS: Internal Review Service
- ISA: International Seabed Authority
- ISO: Independent System Operator
- ISO-NE: Independent System Operator New England
- ISDEAA: Indian Self-Determination and Education Assistance Act
- ISSB: International Sustainability Standards Board
- IT: Information Technology
- ITA: International Trade Administration
- ITC: Investment Tax Credit
- JAMA: Journal of the American Medical Association
- kV: Kilovolt
- kWh: Kilowatt-hour
- LDES: Long-Duration Energy Storage
- LFPA: Local Food Purchase Assistance Program
- LiDAR: Light Detection and Ranging
- LIHEAP: Low Income Home Energy Assistance Program
- LIHWAP: Low-Income Household Water Assistance Program
- LMI: Low- and Moderate-Income
- LNG: Liquefied Natural Gas
- LPO: Loan Programs Office
- LWCF: Land and Water Conservation Fund
- Mbps: Megabits per second
- MCC: Millenium Challenge Corporation
- MEP: Manufacturing Extension Partnership
- MESC: Manufacturing and Energy Supply Chains
- MHBG: Community Mental Health Services Block Grant
- MIECHV: Maternal, Infant, and Early Childhood Home Visiting
- MISO: Midcontinent Independent System Operator
- MMRV: Measurement, Monitoring, Reporting, and Verification
- MOU: Memorandum of Understanding
- MPAs: Marine Protected Areas
- MPGe: Miles-per-gallon-equivalent
- MPOs: Metropolitan Planning Organizations
- MSP: Minerals Security Partnership
- MW: Megawatt
- NACP: National Asthma Control Program
- NAE: Neighborhood Access and Equity Grants
- NAIC: National Association of Insurance Commissioners
- NARUC: National Association of Regulatory Utility Commissioners
- NASA: National Aeronautics and Space Administration
- NASS: National Agriculture Statistics Service
- NATO: North Atlantic Treaty Organization
- NBRC: Northern border Regional Commission
- NCA: Natural Capital Accounting
- NCUA: National Credit Union Administration
- NDC: Nationally Determined Contribution
- NDRCC: National Rural Development Coordinating Committee
- NEPA: National Environmental Policy Act
- NERC: North American Electric Reliability Corporation
- NERC-CIP: NERC Critical Infrastructure Protection
- NETL: National Energy Technology Laboratory
- NEVI: National Electric Vehicle Infrastructure
- NFIP: National Flood Insurance Program
- NGA: National Governors Association
- NGWSGP: Next Generation Warning System Grant Program

- NHSC: National Health Service Corps
- NHTSA: National Highway Traffic Safety Administration
- NIBS: National Institute of Building Sciences
- NIHB: National Indian Health Board
- NIST: National Institute of Standards and Technology
- NM RETA: New Mexico Renewable Energy Transmission Authority
- NOAA: National Oceanic and Atmospheric Administration
- NPS: National Park Service
- NRC: Nuclear Regulatory Commission
- NRCS: Natural Resources Conservation Service
- NSC: National Security Council
- NSF: National Science Foundation
- NSS: National Security Strategy
- NSSP: National Syndromic Surveillance Program
- NSTC: National Science and Technology Council
- NTIA: National Telecommunications and Information Administration
- NTSB: National Transportation Safety Board
- NWS: National Weather Service
- NYISO: New York Independent System Operator
- OBBBA: One Big Beautiful Bill Act
- OCC: Office of the Comptroller of the Currency
- OCED: Office of Clean Energy Demonstrations
- ODNI: Office of the Director of National Intelligence
- OECD: Organization for Economic Co-operation and Development
- OEM: Original Equipment Manufacturer
- OFR: Office of Financial Research
- OGES: Office of Global Energy Security
- OGR: Office of Global Resilience
- OMB: Office of Management and Budget
- ONCD: Office of the National Cyber Director
- OPM: Office of Personnel Management
- ORLP: Outdoor Recreational Legacy Partnership
- OSC: Office of Strategic Capital
- OSHA: Occupational Safety and Health Administration
- OSTP: Office of Science and Technology Policy
- OT: Operational Technology
- OTA: Other Transaction Authority
- PACE: Post-Application Coverage Endorsement
- PBGC: Pension Benefit Guaranty Corporation
- PFAS: Per- and Polyfluoroalkyl Substances
- PGII: Partnership for Global Infrastructure and Investment
- PHMSA: Pipeline and Hazardous Materials Safety Administration
- PILT: Payment in Lieu of Taxes
- PJM: Pennsylvania-New Jersey-Maryland Interconnection
- PMA: Power Marketing Administration
- PME: Professional Military Education
- PNNL: Pacific Northwest National Laboratory
- PPAs: Power Purchase Agreements
- PRA: Paperwork Reduction Act
- PRC: People's Republic of China
- PROTECT: Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation
- PTC: Production Tax Credit
- PUC: Public Utility Commission
- PURPA: Public Utility Regulatory Policies Act
- R-EMS: Rural Emergency Medical Services Training
- R-STEP: Reliable Energy Siting through Technical Engagement and Planning
- R&D: Research and Development
- RBDG: Rural Business Development Grants
- RCCIP: Rural Child Care Innovation Program
- RD: Rural Development
- RD&D: Research, Development, and Demonstration
- REAP: Renewable Energy for America Program
- REH: Rural Emergency Hospital
- REP: Responsible Energy Partnership
- RFI: Request for Information
- RFP: Request for Proposals
- RFSI: Resilient Food Systems Infrastructure Program
- RHT: Rural Health Transformation
- Risk MAP: Risk Mapping, Assessment and Planning
- RMA: Risk Management Agency
- RMK: Responsible Minerals Initiative
- RMUC: Rural and Municipal Utility Advanced Cybersecurity Grant and Technical Assistance Program
- ROI: Return on Investment
- RPN: Rural Partners Network
- RRIF: Railroad Rehabilitation and Improvement Financing
- RTA: Rural and Tribal Assistance Pilot Program
- RTO: Regional Transmission Organization
- ROUTES: Rural Opportunities to Use Transportation for Economic Success
- SAF: Sustainable Aviation Fuel
- SAMHSA: Substance Abuse and Mental Health Services Administration
- SARE: Sustainable Agriculture Research and Education
- SBA: Small Business Administration
- SBIR: Small Business Innovation Research
- SBOM: Software Bill of Materials
- SBRC: Southwest Border Regional Commission

- SCADA: Supervisory Control and Data Acquisition
- SCC: State Corporation Commission
- SCRC: Southeast Cresent Regional Commission
- SEC: Securities and Exchange Commission
- SEEC: Sustainable Energy and Environment Coalition
- SEEA: System of Environmental-Economic Accounting
- SEFI: State Energy Financing Institution
- SHPO: State Historic Preservation Office
- SIREN Act: Supporting and Improving Rural EMS Needs Act
- SMR: Small Modular Reactor
- SPARK: Speed to Power through Accelerated Reconductoring and other Key Advanced Transmission Technology Upgrades
- SPP: Southwest Power Pool
- SRF: State Revolving Fund
- STAG: State and Tribal Assistance Grant
- STEP: State Trade Expansion Program
- SUBG: Substance Abuse Prevention, Treatment, and Recovery Block Grant
- SWAP: State Wildlife Action Plan
- T-yields: Transitional Yields
- TAP: Transition Assistance Program
- TBCP: Tribal Broadband Connectivity Program
- TELGP: Tribal Energy Loan Guarantee Program
- TELI: Tribal Early Learning Initiative
- TFP: Transmission Facilitation Program
- THPO: Tribal Historic Preservation Office
- TIFIA: Transportation Infrastructure Finance and Innovation Act
- TIP: Transportation Implementation Plan
- TPCC: Trade Promotion Coordinating Committee
- TOTAL Survey: Tenure, Ownership, and Transition of Agricultural Land Survey
- TREC: Training for Residential Energy Contractors
- TSP: Technical Service Provider
- TTP: Public Transportation on Indian Reservations Program or Tribal Transit Program
- TTS: Technology Transformation Service
- TTSGP: Tribal Transportation Self-Governance Program
- TVA: Tennessee Valley Authority
- USACE: U.S. Army Corps of Engineers
- USAID: U.S. Agency for International Development
- USDA: U.S. Department of Agriculture
- USDS: U.S. Digital Service
- USEAC: U.S. Export Assistance Center
- USFS: U.S. Forest Service
- USGCRP: U.S. Global Change Research Program
- USGS: U.S. Geological Survey
- USTDA: U.S. Trade and Development Agency
- USTR: U.S. Trade Representative
- V2G: Vehicle-to-Grid
- V2H: Vehicle-to-Home
- VA: U.S. Department of Veterans Affairs
- VAPG: Value-Added Producer Grants
- VCM: Voluntary Carbon Market
- VPP: Virtual Power Plant
- WAP: Weatherization Assistance Program
- WFRP: Whole Farm Revenue Protection
- WHCNAA: White House Council on Native American Affairs
- WIFIA: Water Infrastructure Finance and Innovation Act
- WIOA: Workforce Innovation and Opportunity Act
- WORC: Workforce Opportunities for Rural Communities
- WOTC: Work Opportunity Tax Credit
- WRF: Weatherization Readiness Fund
- WUI: Wildland-Urban Interface






## About SEEC Institute:

The Sustainable Energy and Environment Coalition (SEEC) is a caucus in the U.S. House of Representatives, founded in 2009. It includes more than 100 Members of Congress who advocate for durable and effective environmental policies. In May 2024, SEEC Institute, a nonprofit organization, was launched to address the need for deeper collaboration, more opportunities to convene, and strategic planning to advance climate and clean energy priorities. SEEC Institute works to bring together Congress, the private sector, climate and environmental advocates, academics, and other experts, fostering more regular and meaningful connections and collaboration among stakeholders.



## About the Thriving Economy Project:

The Thriving Economy Project is a menu of policy ideas developed by SEEC Institute in partnership with Members of Congress, former senior congressional aides, officials from multiple presidential administrations, and leading energy and environmental policy experts. Grounded in the belief that a healthy economy and a healthy environment go hand in hand, the project pairs ambitious ideas with practical, actionable solutions to today's interconnected challenges. Together, these recommendations offer a path toward meaningful progress for the greatest number of people in the shortest possible amount of time.

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