



Bad Blueprint: Why Trump Should Ignore the Heritage Plan to Gut Federal Investment

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Numerous reports suggest that the Trump administration is considering adopting Heritage's Blueprint as its own. Doing so would harm U.S. competitiveness, productivity, and innovation.

In April 2011, the Heritage Foundation published a guide to spending cuts in the Department of Energy (DOE). The Information Technology and Innovation Foundation (ITIF) (along with the Breakthrough Institute and Americans for Energy Leadership) responded by pointing out an array of wrongheaded assumptions, illogical arguments, and empirical inaccuracies in this misguided plan.¹ In 2016, Heritage reprised many of these same ideologically based errors and added even more in other areas of federal policy, including trade and competitiveness, in its so-called *Blueprint for Balance*.² In this report, ITIF updates and expands its 2011 response.³ The stakes are much higher now, however. Numerous reports suggest that the Trump administration is considering adopting Heritage's *Blueprint* as its own.⁴ Doing so would harm U.S. competitiveness, productivity, and innovation.

There is no doubt that many federal programs, including some that support business, could be cut, or even eliminated, with little or no negative effect on economic growth. But that doesn't mean that most could. In fact, many programs are intended to compensate for serious market failures and effectively advance one or more of three key national goals: competitiveness, productivity, and innovation. Rather than being cut or eliminated, such programs should be improved and expanded.

Such nuance and pragmatism, however, are not Heritage's strengths; doctrinaire ideology is. Heritage's analysis to support its efforts to cut \$10 trillion from the deficit over 10 years

is marked by profound misunderstandings about markets, technology, and the global economy. Markets sometimes work wonders, but they sometimes fail. They fail to provide sufficient incentives for innovation and knowledge creation. In an environment marked by financial market short-termism, markets fail to foster long-term investments in people and capabilities. And even if markets acting alone did maximize economic welfare, that doesn't mean that maximization will occur on U.S. shores.

The appropriate role of government is to provide help to correct those market failures. Of course, governments, too, fail. They don't always act appropriately. When government fails, reformers, including at Heritage, should try to fix it. But Heritage wants to kill government programs, including some that might be fixed. To foster an innovative and competitive economy in a turbulent and sometimes hostile world, the United States government must have access to an array of tools, but use them judiciously. Heritage's kit contains only one tool: the axe.

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The United States has suffered from underinvestment, both public and private, for more than a decade.⁵ This combined failure of the public and private sectors to invest sufficiently is undermining the national economy. All sectors in American society need to work together to revitalize research, technology, industry, education, and infrastructure. Crippling key functions of the federal government, which would be the consequence of adopting Heritage's *Blueprint*, will set the nation back even further. The remainder of this report lays out key mistakes underlying Heritage's wrongheaded recommendations in trade and competitiveness policy, and in energy and research and development (R&D) policy.

TRADE AND COMPETITIVENESS POLICY

Heritage's proposals to radically reduce or eliminate an array of trade and competitiveness programs are not based on objective analysis of the problems facing the U.S. economy or these programs' role in addressing them. Its proposals are rooted in an ideology that holds that whatever markets induce the economy to produce must be optimal. Like the doctrinaire economist in the old joke, it would not stop to pick up a \$20 bill lying on the ground, believing that if there really was a bill there, someone would have already picked it up.

Yet, when it comes to trade and competitiveness, firms acting on their own often will not maximize the national economic interest. This is an insight that virtually every U.S. governor and mayor, including free-market Republicans, understand: While markets might optimize economic welfare, that does not automatically translate into economic welfare within the geographic confines of their districts. That is why every U.S. state and most American cities, by necessity, have long had robust economic development programs that work to help the business establishments in their jurisdictions become more competitive and productive. Governors and mayors, regardless of partisan affiliation, live in the real world, rather than the fictional world in which Heritage dwells. They realize that if they do not take such actions, their competitors, who live in this same real world, will seize the advantage with their own targeted policies.

We see that in the budget proposals offered by even the most conservative Republican governors, all of whom support state government spending to help individual firms in their states better compete. These governors don't decry this as industrial policy or crony capitalism. They praise it as effective economic development. For example, Governor Rick Scott's (R-FL) latest budget provides funding to "economic development tools and incentives to promote job creation in Florida" and provides Enterprise Florida, a state agency that supports individual Florida firms, with more than \$18 million.⁶ Is Heritage saying that Governor Scott is not conservative enough or doesn't love the free market enough? Governor Matt Mead (R-WY) has proposed forward-looking economic development legislation (ENDOW) that would create a 20-year blueprint to help diversify the Wyoming economy.⁷ Is Heritage calling out Governor Mead for "picking winners" and not being satisfied with the industrial structure the "market" is deciding on for Wyoming? Governor Butch Otter's (R-ID) proposed 2018 budget calls for an increase of almost 10 percent for his state's Department of Commerce, whose mission is to support "the expansion and retention of Idaho businesses and attraction of new businesses to the state."⁸ Is Heritage calling out Governor Otter, who is ranked as the most conservative governor in America, for being a big government spender?⁹

The answer to all three questions is no. Yet Heritage loathes anyone who supports the federal government having economic development programs. What Heritage fails to realize is that it is long past time for the federal government to "think like a state" and recognize that the right policies to help firms become more competitive and productive are not "crony capitalism," but rather essential economic development tools in an era of relentless and unsparing international competition.¹⁰ Heritage, however, would torch many of the modest economic-development tools that the president has to work with, assuming that market forces alone will generate prosperity within our borders. Its *Blueprint* calls for eliminating the Economic Development Administration (EDA), Export-Import (Ex-Im) Bank, Hollings Manufacturing Extension Partnership (MEP), International Trade Administration (ITA), Department of Energy's Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) program, Trade Adjustment Assistance (TAA), the Economic Development Administration (EDA), and Workforce Innovation and Opportunity Act (WIOA) job-training programs, among others.

Following Heritage's advice would undermine the competitiveness of the very industries whose health and growth President Trump has stated is the central focus of his administration. If Heritage wants to eliminate these programs because it wants the *global marketplace* to work better, it should say so. But it should then be accountable to elected officials who would rightly respond that their job is to serve their constituents, not those of foreign nations.

Heritage would never call for cuts in defense programs that would compromise the security of the United States. Yet their proposals for trade and competitiveness policy would unwittingly undercut the economic security on which our national security depends. It is no more or less than a plan for unilateral disarmament in a hostile economic world.

Moreover, any short-run budget savings that Heritage's proposed cuts would yield would be far outweighed by the long-term damage that they would inflict on the U.S. economy.

Heritage's gravest errors are elucidated below.

Heritage assumes that the U.S. economy is not in international competition. For Heritage, the United States does not compete with other nations. That is why it argues that the U.S. government should be indifferent to the fate of industries that are in global competition. For them, if these industries lose market share, other industries will take their place. If the United States loses car production, for example, it can take up car rental. Clearly this argument is wrong. If the United States loses traded-sector output, the nation will also lose jobs, due to the multiplier effect, and the value of the dollar will have to fall, making imports more expensive. For the reality is that nations compete fiercely to incubate, and grow, or attract enterprises in the highest-wage, highest-value-added sectors of economic activity, such as in information technology, life sciences, and advanced manufacturing.

State governors of both parties understand these facts about the real world. That is why their state economic-development programs focus on strengthening their traded-sector firms in international competition. That is why former governor Mike Pence of Indiana pursued policies to bring aerospace, life sciences, motor sports, and defense companies to his state. That is why Delaware's Democratic governor, Jack Markell, focused on corporate headquarters, chemical manufacturing, and life sciences. Far from being "crony capitalism" or "corporate welfare," as Heritage labels them, such strategies are essential if high-value-added, traded-sector activities are going to be located in their states. But despite their creativity and efforts, state programs alone are not enough to help the United States effectively compete. That's why they need to be complemented with federal programs.

MEP and Ex-Im are among the tools that the president has available to complement state and local economic-development strategies. MEP is a public-private partnership with centers in all 50 states, dedicated to increasing the technical and innovation capacity of America's small- to medium-sized (SME) manufacturers.¹¹ In 2016, MEP centers interacted with 25,445 manufacturers, leading to \$9.3 billion in sales, \$1.4 billion in cost savings, and \$3.5 billion in new client investments; and helped create and retain more than 86,602 jobs.¹² Unfortunately, MEP's budget limits its reach; it has barely grown since President Reagan established it in 1988. Japan invests 30 times as much in a similar program to help its SMEs, Germany 20 times as much, and Canada 10 times as much.¹³ Even Britain, which reduced the budget of its Manufacturing Advisory Service (MAS) in 2015, reversed course less than a year later.¹⁴ Eliminating MEP would be one facet of Heritage's plan for unilateral disarmament and would harm U.S. industrial competitiveness and mean fewer U.S. manufacturing jobs.

Ex-Im provides financing and insurance for export transactions that would not otherwise take place because commercial lenders are either unable or unwilling to accept the political or commercial risks inherent in certain deals.¹⁵ As Ronald Reagan put it, "the Export-Import Bank contributes in a significant way to our nation's export sales."¹⁶ It operates at

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no cost to taxpayers; in fact, it makes money for the U.S. Treasury, \$3.8 billion since 2009.¹⁷ Contrary to Heritage's assertions, Ex-Im helps both large and small firms, both directly and indirectly. Ex-Im provides credit that helps thousands of American SMEs launch or expand their export activities every year. In addition, when foreign purchasers of a Boeing aircraft, for instance, receive Ex-Im's assistance, Boeing's 15,600 suppliers, including 6,600 SME manufacturers, benefit along with Boeing itself.¹⁸ Without Ex-Im, sales will go to Airbus, rather than Boeing, to Chinese, Finnish, French, German, and Korean firms, all of whose governments outspend the U.S. federal government.¹⁹ Again, by attacking Ex-Im, Heritage declares unilateral disarmament in an unforgiving world.

In addition to matching international competition by providing vital services to SME manufacturers and other traded-sector firms, the U.S. government should also fight on their behalf against foreign trade restrictions. Global trade operates under rules that the United States helped put in place over the past 70 years. These rules are only enforced when national governments look out for their own interests within the system. As the Trump administration has rightly noted, they can be made stronger and enforced better. In this domain, too, however, Heritage advocates unilateral disarmament.

No president committed to making America great again would cut ITA's Enforcement and Compliance Division, including the U.S. Interagency Trade Enforcement Center (ITEC), the government's nerve center for seeking fair trade, the way the libertarians at Heritage propose. ITA mobilizes resources and expertise across the federal government to ensure compliance with trade agreements negotiated to help industry in the United States.²⁰ Foreign theft of U.S. intellectual property, for example, is estimated to cost the U.S. economy at least \$300 billion each year.²¹ Cases brought by ITEC that contest these practices and many others, such as denying U.S. firms access to markets and imposing local content requirements, more than pay for themselves. In fact, ITEC's budget (a mere \$9 million in 2015) is far below what an honest analysis of its benefits and costs would imply. By eliminating it, Heritage would leave U.S.-based enterprises and American workers at the mercy of their foreign competitors.

Heritage ignores market failures. Markets are wonderful at allocating resources when they conform to the assumptions of standard economic models. Unfortunately, the real world routinely violates these assumptions in nontrivial ways.²² As a result, firms and individuals operating in imperfect markets underinvest in key activities that are essential for the economy's long-term vitality. Heritage's *Blueprint* would subvert the federal government's capacity to address such market failures. If implemented, these cuts would further distort the U.S. economy by reducing entrepreneurship, weakening skills, and blinding business decisionmakers.

One market failure relates to technology commercialization, where a host of institutional and other barriers lead to far less than optimal private-sector activity.²³ The SBIR/STTR programs play a role in addressing this market failure. They provide grants to SMEs that are unable to secure financing from banks, venture capitalists, or other private investors to

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develop and commercialize nascent technologies. These projects are perceived by potential investors as too risky to fund or taking too long to pay off, yet many do. In addition to pioneering firms that have remained relatively small, such as ABIOMED (which makes the world's smallest heart pump), Aerovironment (unmanned aircraft), and Nanosys (quantum dot displays), SBIR/STTR has also helped launch firms such as Apple, Qualcomm, and Amgen, which employ hundreds of thousands of Americans.²⁴ Companies like these are able to secure private capital once SBIR/STTR validates their viability. Companies that have received SBIR/STTR grants currently employ more than a half million engineers and scientists, generate 10 new patents every day, and have played instrumental roles in improving Americans' quality of life, strengthening America's defense capabilities, and generating economic growth.²⁵ Cutting back SBIR/STTR, as Heritage proposes, would weaken the United States' capacity for private-sector innovation.

The federal government also seeks to compensate for the free market's failure to provide timely and accurate information about global markets. Even with the Internet, it is not easy to know what foreign customers will pay for or how to get products and services to them. SMEs, which generally lack an overseas presence, are particularly disadvantaged. ITA's U.S. Commercial Service supplies trade counseling, local market intelligence, business matchmaking, commercial diplomacy, and trade promotion programs through a network spanning U.S. embassies globally. It operates more than 100 U.S. Export Assistance Centers (USEACs) that support SMEs that are new to exporting or want to expand their exports.²⁶ ITA also fosters investment in the United States by foreign companies that want to create jobs here and need information about how best to do so. The Select USA program links these investors to opportunities and to state and local partners across the country. Foreign direct investment in the United States exceeded \$1.2 trillion in 2015, a massive inflow that helps drive the domestic economy.²⁷ Divesting the federal government of such service offerings would leave the field clear to foreign governments who not only perceive the vital role of building the export capacity of their own companies, but also seek to induce U.S. companies to invest abroad.

Heritage forgets that economics is "political economy." If the Heritage authors could move beyond their reading of Adam Smith's *The Wealth of Nations*, they might realize that economics is not nearly as pure as they imagine it to be; markets and politics are really intertwined in a "political economy." To wit: Even if one insists that unencumbered market forces alone are welfare enhancing (they are not), those forces can produce considerable blowback among people who live and work in the real world. Everyone saw that on November 8, 2016. And that backlash erodes support for business, for markets, for trade, and for technological innovation. That is one reason why all levels of government, including the federal government, have programs to help regions and workers that have been hurt by market forces.

The Economic Development Administration is one of the few federal government agencies with the specific mission of helping economically distressed regional economies. The demand for EDA programs has vastly exceeded the agency's capacity to support all the

regions around the United States that have been hurt by globalization. To be sure, EDA needs to more narrowly target its activities around its core mission of helping distressed regions. But that mission is critical and, without it, Americans can expect more, not less, regional economic distress.

Likewise, federal job-training programs under WIOA and support under TAA help workers to better navigate labor markets made turbulent by trade and technology. As the U.S. economy becomes increasingly technology intensive and innovative, workers, whether new to the workforce or well into their careers, must acquire current, specific skills and knowledge to maximize their paychecks. However, the market for training services is so poorly organized that workers often have trouble finding programs that will deliver value, and they may lack the resources to pay the upfront cost for a training investment that will pay off handsomely over time. Public job-training programs such as TAA and WIOA help match up employers who demand certain skills with institutions that can train workers in these skills and the workers themselves. To be sure, these programs do not function as well as they ought to, but they have been reformed recently, and their new models should be allowed to develop. WIOA, for example, which passed Congress in 2014 with a wide bipartisan majority, was the first major update of the federal training system in 15 years. The WIOA reforms will enhance more than a dozen programs that receive \$10 billion in annual training and education funding, serving approximately 20 million Americans each year.²⁸ Likewise, 2.2 million American workers have benefited from the TAA program since 1974, including almost 50,000 in 2015, over 90 percent of whom reported gaining new skills and credentials.²⁹ Eliminating, rather than further reforming, programs like TAA and WIOA would consign many American workers to unemployment and underemployment.

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Heritage assumes that all government programs must be failures simply because they are run by government. That policies should be based to the extent possible on evidence is simple common sense. While it is true that program evaluation is difficult and often subject to alternative interpretations, the research and analysis community must do the best that it can in this regard. Yet Heritage's ideological predisposition overwhelms any evidence to the contrary, including evidence relating to many of the trade and competitiveness programs covered in the *Blueprint*.

SBIR/STTR is a great example. The National Academy of Sciences has released no fewer than 17 reports documenting that these programs have consistently met their congressionally chartered objectives.³⁰ According to a recent Air Force Economic Impact Study, every dollar spent on its SBIR program returned \$3.60 in sales and 50 cents of additional outside investment or venture capital; moreover, Air Force SBIR grants have produced more than 400 mergers and licenses. As many as 22 percent of the winners of the R&D 100 Award (which are selected by *R&D Magazine*) have been companies that received SBIR grants at some point in their history.³¹ Likewise, 43 percent of the innovative start-up firms with fewer than 25 employees in a recent ITIF study of such firms had received an SBIR grant.³²

MEP is another example of a program backed by ample evidence to support its continuation, if not expansion. For every dollar of federal investment, according to research estimates, MEP generates \$19 in new sales growth and \$21 in new client investment for the firms it works with. This translates into \$2.2 billion in new sales annually.³³ And for every \$1,978 of federal investment, MEP creates or retains one manufacturing job. Since 1988, MEP has worked with 94,033 manufacturers, leading to \$98.7 billion in sales and \$17.1 billion in cost savings, and has helped create or retain more than 884,596 jobs.³⁴

Finally, Ex-Im has been the subject of close analytical scrutiny. As we noted above, this agency operates at no net cost to the taxpayers and has supported 1.7 million private-sector jobs over the past decade.³⁵ In 2015, when Congress prevented it from approving transactions greater than \$10 million, each day cost U.S. businesses an estimated \$50 million in exports.³⁶ Not surprisingly, 60 percent of U.S. exporters and lenders have deemed the U.S. Ex-Im Bank “uncompetitive” relative to its global peers.³⁷

ENERGY AND R&D POLICY

Like its ideas about trade and competitiveness policy, Heritage’s proposals for federal energy and R&D programs betray a simplistic understanding of how the world really works. Its ideological bias is particularly detrimental in these two interconnected areas because market failures there are more profound than in other sectors. Energy markets are intrinsically prone to breakdown, resist large-scale innovation, and contribute significantly to environmental damage and international insecurity. Markets underinvest in R&D because R&D is too risky, long-term, and unpredictable to provide an adequately certain return, even though society, including private-sector energy innovators, benefit from such risk-taking.

Heritage proposes to eliminate DOE’s Offices of Fossil Energy (FE), Energy Efficiency and Renewable Energy (EERE), and Electricity Delivery and Energy Reliability (OE); and to cut the Office of Nuclear Energy (NE) by more than one-third. It would obliterate the Advanced Research Projects Agency–Energy (ARPA-E), Energy Innovation Hubs, and DOE’s Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) program. Beyond DOE, Heritage would decimate efforts by the Department of Defense (DOD) to become a more efficient and innovative-energy consumer. If implemented, Heritage’s proposed cuts, which are driven by a vision of a mythical world in which all forms of energy compete on a level playing field, would dramatically slow the pace of clean-energy innovation in the private sector in the United States and undercut the nation’s ability to compete in the burgeoning global clean-energy market.

If the United States fails to accelerate its progress toward cheaper, cleaner energy, the pressure for a regulatory and tax response to reduce reliance on dirty energy will grow. What Heritage fails to understand is that federal support for clean-energy innovation will limit the need for such costly and heavy-handed responses. Moreover, Heritage’s proposals to eliminate all climate-related programs fly in the face of the scientific consensus that

climate change is real, detrimental, and caused by human activity, especially fossil-fuel consumption. Global action to avoid the worst consequences of climate change depends on the leadership of the most innovative nation in the world. Yet venture capital and private-equity investment in American renewable-energy companies peaked in 2008 at \$5.4 billion and slipped to \$2.2 billion in 2014.³⁸

The scientific capabilities of the United States, which underpin and support the nation's world-class innovators, are the envy of the world. Entrepreneurs from every corner of the globe still flock here to join native-born workers at American companies and to start new businesses. Researchers and students, too, come to this country from all over the world to work and study alongside their colleagues in academic and government laboratories. Together, these institutions have catalyzed breakthroughs that have led to the development of huge new industries and transformed society. Heritage's *Blueprint* would further chip away at the foundations of this uniquely American success story.

Federal investments, like many of those made by DOE programs on Heritage's hit list, expand energy markets and foster transformational innovation by reducing risks.

Heritage proposes significant cuts in basic research funded by DOE. While it acknowledges the legitimacy of such funding, it arbitrarily takes the fiscal 2008 budget as establishing the appropriate level for nuclear physics, advanced scientific computing, and basic energy sciences, reducing current budgets by more than \$700 million. Largely because of its animus toward climate-related research, Heritage also calls for the elimination of DOE's \$622 million biological and environmental research program and climate-research funding in EPA's Office of Research and Development. Other proposed cuts include more than \$250 million from the DOD budget for medical research and well over \$100 million in other EPA research programs.

Heritage's *Blueprint* for energy and R&D policy disrupts American leadership, undermines the U.S. economy, and threatens the environment. Whatever benefits the proposed cuts might yield in the federal deficit are far smaller than their costs to vital national interests.

Heritage's most important errors and misunderstandings regarding energy and R&D are discussed below.

Heritage is blind to biases in market-driven energy innovation that favor incumbents. The enormous scale and long lifetimes of power plants, pipelines, and other components of the current U.S. energy system foster incremental innovation in dirty energy but impede transformational clean-energy innovation. Vehicles that are not based on petroleum-consuming internal-combustion engines, for instance, require a completely new fueling infrastructure. Distributed energy resources, such as rooftop solar panels, require a grid that has been upgraded to handle two-way electricity transmission, unlike today's one-way system. The technical difficulty and financial risks of building huge new systems like these discourage many entrepreneurs and innovators.³⁹ Federal investments, like many of those made by DOE programs on Heritage's hit list, aim to expand energy markets and foster transformational innovation by reducing these risks.

The political and economic power of incumbent fossil-fuel producers and electric utilities represent another risk to energy innovators. This power is reflected in both overt and hidden federal subsidies, ranging from cheap access to public lands for resource extraction to the use of U.S. military and diplomatic power to secure energy supplies and supply lines abroad. The power of incumbents is also exercised at the state level, where they may bias the decisions of public-utility commissions and other regulatory bodies.⁴⁰ The playing field in energy simply is not level, as Heritage imagines. The federal government must continue to work through DOE and other agencies to make clean energy cheaper through innovation, so that innovators will be able to overcome their long-entrenched rivals.

Heritage denies the complementarity between public and private clean-energy innovation investments. The long-discredited “linear model of innovation” describes a fictional world in which science is funded by the public sector, while technology is the domain of the private sector. In the real world, the innovation process is nowhere near that neat, especially for large-scale complex technical systems, such as energy. A better model of innovation pictures the process as a continuum, with middle stages in which public and private actors work together.⁴¹ Toward the science end of this continuum, where ARPA-E and the Energy Innovation Hubs do their work, the government provides the lion’s share of the funding. This funding builds knowledge and capabilities that then enable the best companies to receive follow-on investment from venture capitalists and other private sources. Toward the technology end of this continuum, where DOE’s applied-energy offices (Fossil Energy, Energy Efficiencies and Renewable Energy, Electricity Delivery and Energy Reliability, and Nuclear Energy) do much of their work, the private sector puts up most of the money for demonstration projects, manufacturing process development, and other capital-intensive activities. Although the public contributes a minority share to such technology development, this investment provides a critical margin that enables firms to move their innovations into fully commercial use. Such programs also provide information and technical assistance and facilitate communication and coordination across dispersed market participants, so that entrepreneurs and innovators can thrive in energy markets.

Heritage exaggerates the shortcomings of programs and proposes elimination when reform makes more sense. Federal energy programs are far from perfect. Their leaders must navigate a complex and unpredictable technical, economic, and political domain that is full of obstacles. They are burdened with missions and mandates from Congress and the president that are vague, contradictory, and changeable. Their culture and decision-making processes are slow and sometimes inscrutable. Some of their decisions are bad. Yet, to address these many imperfections by eliminating the programs is fatuous. The problems and challenges they were created to respond to have not disappeared. If Congress were to disband them, it is quite likely that they would be re-created again when the next energy crisis rears its ugly head. Many promising reforms of federal energy agencies have been proposed, and some have been implemented. DOE’s performance, in particular, has improved in recent years. The axe is a useful tool, but sometimes a carving knife or even a scalpel is more effective. In fact, Heritage signed on with ITIF (and the Center for American Progress) in a report laying out needed reforms of the DOE laboratory system.⁴²

For the first time since 1953, the federal government now provides less than 50 percent of the nation's basic research funding.

Heritage underestimates the potential value of alternative energy to DOD and the barriers to procuring it. DOD is the nation's largest consumer of energy, and its overseas operations are highly energy intensive. The lives of American troops and the security of U.S. bases depend on reliable and resilient energy supplies. In order to provide an adequate margin of safety, DOD energy supply systems are overengineered and expensive. In Afghanistan, for example, it was estimated that every gallon of fuel used by front-line troops cost more than \$400, due in part to the energy expended to get it there.⁴³ Microgrids, solar power, and other new technologies have the potential to strengthen the U.S. military, and it makes sense to continue to invest defense dollars in their development and testing, rather than cut such efforts off, as Heritage demands.

Despite the promise of such innovations, DOD's labyrinthine acquisitions and procurement bureaucracy has moved very slowly in adopting them. Long-established defense contractors tend to dominate purchasing simply because it is easier for DOD to do business with them than to change. A recent report by Noblis, for example, found that DOD was leaving \$1 billion a year on the table in energy-efficiency savings at military bases.⁴⁴ The mandate that DOD purchase more green energy, which Heritage calls for repealing, is intended to break such entrenched patterns. While the mandate is a blunt instrument, it is likely to unlock significant savings as well as improve the effectiveness of the military. Energy technologies developed by the military might also find civilian applications, just as technologies originally developed for defense purposes have done in fields such as aerospace and information technology.

Heritage's proposed cuts would further underfund and imbalance federal investments in science and destroy the national laboratory system. The scientific enterprise and the economy should grow in parallel with one another, so that firms have a deep and rich pool of ideas and talent they can tap into to solve problems and identify opportunities. But federal funding for R&D, and especially for basic research, is not keeping up with U.S. economic growth. For the first time since these data were first recorded in 1953, the federal government now provides less than 50 percent of the nation's basic research funding. Federal funding for research as a share of GDP is just 60 percent of what it was in 1976. Moreover, the physical sciences, mathematics, and engineering, of which the DOE Office of Science is a major funder, accounted for only about one-third of this investment in 2016.⁴⁵ Science policymakers have sought to rectify the imbalance between these disciplines and the more generously supported life sciences for more than a decade. Heritage's proposals would set back this effort, which has been ratified by the COMPETES Act and other federal legislation. As the United States cuts back on its science investment, other countries are accelerating theirs, in order to attract global talent and compete with the United States at the cutting edge.

DOE's national laboratory system was founded to support the Manhattan Project during World War II. It includes such iconic institutions as Argonne, Lawrence Berkeley, and Oak Ridge National Laboratories. The national labs are unique concentrations of technical capabilities that support multidisciplinary research on national problems and maintain

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large-scale scientific facilities used by colleagues throughout academia and industry. Heritage’s proposed cuts to the DOE Office of Science, along with the elimination of DOE’s applied-research offices, would decimate this system. With the exception of the three that work primarily on nuclear weapons, the national labs rely on these offices for the majority of their funding.⁴⁶ The proposed cuts would cause a massive hemorrhaging of talent, disperse the labs’ critical mass, and leave valuable digital and scientific infrastructure to rust. Heritage should be pushing for Congress to enact the reforms that it supported with ITIF and the Center for American Progress in 2013, rather than seeking to eliminate the labs themselves.⁴⁷

The national labs are among the nation’s premier resources for high-performance computing, so Heritage’s proposals would be particularly damaging to this key field. The National Strategic Computing Initiative (NSCI), which was begun in 2015, aims to solve difficult computational problems across a wide range of scientific, engineering, and business fields, accelerating economic competitiveness, enhancing science leadership, and strengthening national security. Boeing’s use of supercomputers at Oak Ridge National Laboratory, for instance, enabled it to bring safer, more efficient aircraft to market quickly and cheaply, strengthening its competitiveness.⁴⁸ Heritage would cripple this important initiative. Rolling back DOE advanced-computing research funding to 2008 levels, a cut of approximately 35 percent, would cede the advantage to America’s global competitors, which are doing the exact opposite—significantly increasing their investment in R&D and deployment of these technologies.⁴⁹ And, by demolishing the existing infrastructure, this cut would constrain future computing initiatives at the national laboratories.

CONCLUSION

America’s economic and energy challenges are too great for policy to be shaped by ideological extremists, either on the right or the left. Smart, limited government programs to help businesses in America are not crony capitalism—a term with no real meaning in this context. Rather they are smart economic development programs, the very same kind that the most conservative Republican governors champion, and the means to support innovation in energy and progress in science.

Finally, there is no question that the federal government faces a severe budget challenge. But there are two key things to recognize regarding the budget deficit and debt. First, the gross amount of debt is less important than its ratio to national income or GDP. Any policies (spending or tax) that effectively spur productivity growth should be enacted even if they increase the budget deficit. The programs listed above do that. Second, defenders of these programs, especially on the left side of the aisle, will need to recognize that unless they place real entitlement reform on the table, especially raising the retirement age (as H.R. 6489 would do), it will be increasingly difficult to defend the budgets of national economic development and innovation programs.

ENDNOTES

1. Matthew Stepp et al., “Counterpoint: Heritage Foundation Backgrounder” (Information Technology and Innovation Foundation, Breakthrough Institute, and Americans for Energy Leadership, April 26, 2011), <https://itif.org/publications/2011/04/26/counterpoint-heritage-foundation-backgrounder>.
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