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Science Policy: Priorities and Reforms for the 45th President

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Abstract

The next President needs a responsible, proactive science policy that will help to jump-start Washington's lagging efforts at keeping the nation safe, free, and prosperous. The executive branch has a responsibility to promote sound public policy and to ensure that the government has access to the scientific resources necessary for advancing national interests. Such a policy will require a shift from maintaining expansive science-related support infrastructure to an approach that relies more on the private sector and brings accountability to regulatory science.

Federal involvement in science and technology is far-reaching, spanning all three branches of government. It has developed over decades from wartime objectives, layers of legislation, diverse presidential Administrations, and growing regulation.

Federal participation in science and technology has aided the nation in meeting national security needs and exploring the frontiers of human knowledge. However, it has become ill-fitting and poorly rationalized for today's needs. There is little guiding rationale for the appropriate role of government in research and development, which too often interferes in the free market and now spans everything from basic research to commercialization of politically preferred technologies. Executive agencies and bureaucrats have exploited science to evade accountability for policy judgments.

The next President of the United States needs a responsible, proactive science policy that helps jump-start Washington's lagging efforts at keeping the nation safe, free, and prosperous. In particular, a focused policy would zero in on the executive's responsibility to (1) promote sound public policy; (2) promote responsible stew-

Key Points

- Federal science and technology policy stretches across all three branches of government. The current approach is expensive, poorly rationalized, and heavy-handed.
- The next President of the United States should begin reforms in three broad categories: downsizing bureaucracy, rationalizing R&D, and bringing accountability to regulatory science.
- The Office of Science and Technology should be eliminated, as it does not provide any service to the President that specially appointed committees do not, as has historically been the case.
- The billions of dollars in R&D infrastructure and funding should be rationalized, limiting funding to specific constitutional responsibilities and contributing to basic research where the private sector is not active.
- The next President should introduce transparency and accountability to regulatory science as one of the most impactful and invasive federal activities on American facilities and businesses.

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ardship of the government's scientific resources, programs, infrastructure, and activities; and (3) harness competitive advances in science for protecting the nation's security

In order to bring about meaningful reform, promote sound public policy, and advance national interests efficiently, the next President should exhibit leadership and call for reforms in three broad areas of science policy in the executive branch: (1) eliminate the bureaucracy of the Office of Science and Technology Policy; (2) rationalize the billions of dollars spent on federal research and development; and (3) introduce strict scientific transparency and integrity to regulatory science. These measures would appropriately redefine the government's size and scope, thereby increasing market competition in science and technology and paving the way to true innovation.

The Role of Science in Executive Policy and Problems with Science Research Today

Science and technology policy has an important, but narrow, role in the executive branch. Science and technology policy should meet two criteria: It should (1) meet a clear government objective, and (2) be developed *only* when the private sector is not already addressing, or does not have the capacity to address, the need. Historically, science policy has appropriately and effectively fulfilled this role. However, the politicization and bureaucratization of science policy has frustrated scientific advancement and jeopardized sound policy.

In 1945, a report by the Office of Scientific Research and Development declared science a legitimate concern of the government, popularly marking the beginning of modern science policy.[1] Based on the lessons of World War II, this report called for a dramatic increase in federal spending for science-related activities. While the report itself led to few substantial reforms in its immediate wake, it "ushered in a new era in which science was viewed as vital for progress towards national goals in health, defense, and the economy."[2]

The Cold War escalated the federal government's involvement. The nuclear arms race between the U.S. and the Soviet Union placed pressure on the government to increase spending on science and technology and led to a rapid and substantial expansion of the government's science policy framework to give the U.S. a technological edge. The rapid buildup of the federal science enterprise also gave rise to a massive system of energy-, science-, and weapons-focused national labs across the country. Within the context of the Cold War, America's government-controlled science and technology enterprise was appropriate, relevant, and effective. That is no longer the case.

While science and technology are still important tools for informing policy decisions, the expansive federal regulatory enterprise has undermined true scientific innovation. Both political and scientific communities exploit a variety of mechanisms in order to manipulate scientific evidence and advance hidden policy agendas.

Politicians, bureaucrats, and special-interest groups often manipulate facts (or alleged facts) and present them as scientific evidence in order to support a specific political agenda. This issue manifests itself in both the *politicization of science*, "when political decision-makers attempt to distort what scientific studies conclude,"[3] as well as the *scientization of policy*, "when scientists and others attempt to exert influence on policy decisions by selectively presenting, or even distorting, scientific findings."[4]

Scientists or federal scientific advisory committees tend to select the data that benefits their agenda or miscommunicate risk, thereby eliminating legitimate policy options in order to substantiate their own preferred option. Similarly, politicians may shield taxpayer-funded research from the public's eye or claim that they are merely "following the science" when in fact they have made a policy choice

1. Vannevar Bush, *Science The Endless Frontier: A Report to the President, Office of Scientific Research and Development*, Executive Office of the President (Washington: U.S. Government Printing Office, 1945), http://www.nsf.gov/about/history/vbush1945.htm (accessed May 18, 2016).
2. Roger Pielke Jr., "In Retrospect: *Science–The Endless Frontier*," *Nature*, Vol. 466 (August 19, 2010), http://sciencepolicy.colorado.edu/admin/publication_files/2010.24.pdf (accessed May 18, 2016).
3. Susan Dudley, "Regulatory Science and Policy: A Case Study of the National Ambient Air Quality Standards," George Washington University Regulatory Studies Center, September 9, 2015, https://regulatorystudies.columbian.gwu.edu/sites/regulatorystudies.columbian.gwu.edu/files/downloads/SDudley_Regulatory_Science_NAAQS%202015-09-09.pdf (accessed May 18, 2016).
4. Ibid.

for what they deem is the best response to scientific information.[5] This tactic ignores many relevant variables, such as cost, risk, likelihood of success, impact on personal liberty, and feasibility of policy alternatives. The result is a serious lack of rigorous, transparent, and independent scientific analysis.[6]

These issues also perpetuate the notion that "science is settled" by manipulating scientific data to manufacture consensus, as well as by politically coercing scientists to corroborate only the consensus.[7] Science, by its very nature, is rarely settled. However, in an environment with a pre-determined outcome, differing ideas that challenge the scientific norm are attacked within scientific communities, the media, and the federal government. This not only results in bad public policy, but ultimately restricts true scientific innovation, integrity, and progress.

Executive science and technology policy demands reform. In order to rid the federal science and technology enterprise of nebulous bureaucracy and troublesome politicization, the next President should eliminate the Office of Science and Technology Policy, rationalize federal R&D priorities and spending, and bring accountability to regulatory science.

Downsizing Bureaucracy in the Office of Science and Technology Policy

Science is an important tool among many to inform the President's policy decisions.[8] As Dr. Roger Pielke of the University of Colorado has written, "a president does not make scientific judgements. A president makes political judgements that may involve scientific or technical considerations in the evaluation of alternatives for action." Pielke continued, quoting President Clinton's first Office of Science and Technology Policy Director, Jack Gibbons: "Science is not an overarching national goal for the president. It's only as it serves to help achieve these larger goals that science takes its place in the crown of important activities for the president."[9]

Congress passed the National Science and Technology Policy, Organization, and Priorities Act of 1976,[10] within which Congress created the Office of Science and Technology Policy (OSTP) "to provide within the Executive Office of the President advice on the scientific, engineering, and technological aspects of the issues that require attention at the highest levels of Government."[11] However, in doing so, Congress instigated an ill-defined bureaucracy that does not uniquely meet the needs of the President in obtaining science advice.

The mission of the OSTP is vague, and its bureaucracy has grown accordingly. Within the OSTP, the President's Council of Advisors on Science and Technology (PCAST) is an advisory group of the nation's leading scientists and engineers who provide scientific and technical advice and make policy recommendations to the Executive Office.[12] There is also the National Science and Technology Council (NSTC), a Cabinet-level council chaired by the President, which coordinates and integrates science and technology policy across executive departments.[13] The NSTC is also responsible for planning federal research and development strategies and develop-

5. Gina McCarthy, "U.S. EPA: We Need Tougher Ozone Standards," CNN Money, November 26, 2014, http://money.cnn.com/2014/11/26/news/economy/epa-stronger-ozone-standard/ (accessed May 23, 2016).
6. Dudley, "Regulatory Science and Policy."
7. For example, David Kreutzer, Nicolas D. Loris, Katie Tubb, and Kevin Dayaratna, "The State of Climate Science: No Justification for Extreme Policies," Heritage Foundation *Backgrounder* No. 3119, April 22, 2016, pp. 3–4, http://thf-reports.s3.amazonaws.com/2016/BG3119.pdf.
8. Jack Spencer, ed., *Environmental Conservation: Eight Principles of the American Conservation Ethic*, (Washington, DC: The Heritage Foundation, 2012), http://www.heritage.org/research/projects/environmental-conservation#EightPrinciples.
9. Roger Pielke Jr., "Who Has the Ear of the President?" *Nature*, Vol. 450, No. 15 (November 2007), http://sciencepolicy.colorado.edu/admin/publication_files/resource-2574-2007.28.pdf (accessed May 18, 2016).
10. National Science and Technology Policy, Organization, and Priorities Act of 1976, Public Law 94–282, Title 1 §101(a): "recognizing the profound impact of science and technology on society, and the interrelations of scientific, technological, economic, social, political, and institutional factors."
11. National Science and Technology Policy, Organization, and Priorities Act of 1976, Public Law 94–282, Title 2 §204(a).
12. White House, Executive Office of the President, "About: Office of Science and Technology Policy–Council of Advisors on Science and Technology," https://www.whitehouse.gov/administration/eop/ostp/pcast (accessed May 18, 2016).
13. George H. W. Bush, "Establishment of the National Science and Technology Council," Executive Order No. 12881, November 23, 1993, https://www.whitehouse.gov/administration/eop/ostp/nstc/about/executiveorder (accessed March 23, 2016).

ing budget proposals for the Office of Management and Budget (OMB).[14] Each presidential Administration has staffed and used (or not used) the office in different ways.[15] Under the Obama Administration, the bureaucracy in the OSTP itself has grown to the maximum four associate directors allowed by Congress, covering the areas of science, technology and innovation, energy and environment, and national security and international affairs.[16] At times more than half the staff (in the form of visiting "detailees") has been funded through budgets outside the OSTP, giving Congress less oversight via appropriations.[17]

For all this bureaucracy, even the Congressional Research Service questions the very purpose of the science advisor: "Is it the role of the science advisor to serve as an advocate and voice of the President? Or is the science advisor's role instead to make the President aware of the views of the S&T [science and technology] community in regards to national policy? Or is the science advisor to provide their [sic] personal views on an S&T policy issue to the President? Or is it a combination of the three?"[18]

Rather than service primarily to the President, there are some indications that the OSTP functions to meet the interests of the scientific community. Upon entering into the position of Director under the Reagan Administration, George Keyworth was met with opposition from the scientific community for stating that "[n]owhere is it indicated that the OSTP or its director is to represent the interests of the scientific community as a constituency" or an "inside lobby."[19] In other instances, the OSTP works counter to the President's needs. Although the President has wide discretion over management and policy of the OSTP, Congress created and annually appropriates its budget. This has caused tension where Congress expressly forbids the OSTP to engage in certain activities that the President requests.[20]

Even some of the more successful OSTP directors enjoying good relationships with the President lacked influence to carry out science policy within the President's own executive offices.[21] For instance, the 2013 omnibus spending bill instructed the OSTP to develop a strategic plan for science, technology, engineering, and math (STEM) education in order to "provide better oversight of and guidance to" the federal government.[22] According to the Congressional Research Service, the OSTP recommended to cut or combine half of the federal STEM programs, increase total spending, and designate lead agencies.[23] Yet the recommendations failed to be adopted as some feared their preferred programs would be cut during the appropriations process while others would not. Despite the OSTP's efforts, political interests overruled it.

Despite the blooming bureaucracy of the OSTP, Presidents have independently formed their own scientific advisory boards and committees to meet their specific policy needs since the 1930s and even after the creation of the OSTP.[24] One example is President Franklin Roosevelt's wartime Office of Scientific Research and Development, created by

14. Dana A. Shea and John F. Sargent Jr., "Office of Science and Technology Policy (OSTP): History and Overview," Congressional Research Service, March 28, 2016, https://www.fas.org/sgp/crs/misc/R43935.pdf (accessed May 18, 2016).
15. Pielke, "Who Has the Ear of the President?"
16. Shea and Sargent, "Office of Science and Technology Policy," March 2016, pp. 5–6.
17. Ibid., pp. 8–11.
18. Deborah Stine, "Science and Technology Policymaking: A Primer," Congressional Research Service *Report for Congress*, May 27, 2009, p. 20, https://www.fas.org/sgp/crs/misc/RL34454.pdf (accessed May 18, 2016).
19. John Sargent Jr. and Dana Shea, "The President's Office of Science and Technology Policy (OSTP): Issues for Congress," January 13, 2014, p. 3, https://www.fas.org/sgp/crs/misc/RL34736.pdf (accessed May 18, 2016).
20. For example, congressional appropriations that forbid OSTP "to develop, design, plan, promulgate, implement, or execute a bilateral policy, program, order, or contract of any kind to participate, collaborate, or coordinate bilaterally in any way with China or any Chinese-owned company." Sargent and Shea, "The President's Office of Science and Technology Policy," January 2014, pp. 26–28.
21. David Goldston, "US Election: Not the Best Advice," *Nature*, Vol. 455, No. 453 (2008), http://www.nature.com/news/2008/080924/full/455453a.html (accessed May 18, 2016).
22. Congressional Record, March 11, 2013, p. S1308, https://www.congress.gov/congressional-record/2013/03/11/senate-section/article/S1287-1 (accessed May 18, 2016).
23. Sargent and Shea, "Office of Science and Technology Policy," January 2014, pp. 36–37.
24. Shea and Sargent, "Office of Science and Technology," March 2016, pp. 1 and 26–29.

executive order in 1941. Another is PCAST, which was originally created under the auspices of the OSTP by President George H. W. Bush through executive order and has been renewed by every President since.[25] The President has many sources of accurate, timely, and relevant scientific advice within the executive branch, not least of which are the individuals appointed by the President himself to head the executive agencies and departments.

The OSTP and its surrounding bureaucracy do not provide anything in service to the President that specially appointed committees might not also accomplish, as has historically been done. Eliminating the OSTP (or at least electing not to staff it until Congress can act) would not block the President from access to science and technology advice. Rather, it eliminates a *formal* office whose purpose is unclear and whose capabilities are largely redundant with what the President is able to, and already does, access through his executive agencies and through his own advisory committees.

Rationalizing Federal R&D Priorities and Spending

In order to create meaningful change in science policy, the next President must address one of the most expensive conduits of science policy: federal research and development (R&D). Most of today's science and technology infrastructure and spending approaches grew out of the World Wars and evolved to meet America's national security needs throughout the Cold War. However, the federal government has lacked a clear objective for federal science and technology since that conflict ended. Consequently, existing infrastructure (most notably the national labs) and government spending are poorly rationalized and utilized today.

According to the National Science Foundation, total research and development funding in the U.S. was $456.1 billion in 2013, 65 percent of which came from the business sector.[26] The federal government was the second-largest funder of R&D at $127.3 billion spread across 15 departments and 12 agencies. The vast majority of federal expenditures were from just seven agencies: the Departments of Agriculture, Commerce, Defense, Energy, and Health and Human Services; the National Science Foundation; and NASA, each with $1 billion or more in R&D budgets. This is in addition to indirect federal involvement through tax credits for R&D.

Additionally, the executive branch manages 42 federally funded research and development centers (FFRDCs), including the 17 Department of Energy national labs and facilities, operated by universities, businesses, and nonprofits.[27]

The increase in federal funding in the science and technology sector has actually distorted private-sector investment. In an attempt to address this concern, since 1980, Congress and Presidents have passed 16 laws and executive orders attempting to encourage the transfer of federal R&D to the private sector.[28] Unfortunately, the government's approach to R&D remains problematic.

Rationalizing federal scientific R&D requires reining in federal funding. Problems arise when federally funded R&D diverts scarce public resources from either (1) meeting a specific national objective or (2) contributing to basic research.

Criterion One: Meeting Clear National Objectives. Federally funded R&D is most appropriate when used to achieve a specific, narrow government objective. For example, providing for the national defense is a clear constitutional responsibility of the federal government. It is appropriate to target research and development funding to advance the military's capabilities to keep America safe. However, it is unsurprising that, given its large R&D budget, public resources in the Department of Defense have been diverted to meet political goals rather than battlefield objectives.

For example, it may very well be a mission critical objective for the Defense Department to research and test alternative fuels that provide a strategic advantage and operational security. However, the

25. Ibid., p. 14.
26. National Science Foundation, *Science & Engineering Indicators*: 2016, Chapter 4: Research and Development: National Trends and International Comparisons (Arlington, VA: National Science Foundation, 2016), http://www.nsf.gov/statistics/2016/nsb20161/uploads/1/7/chapter-4.pdf (accessed May 18, 2016).
27. National Science Foundation, "Master Government List of Federally Funded R&D Centers," June 2015, http://www.nsf.gov/statistics/ffrdclist/ (accessed May 18, 2016).
28. National Science Foundation, *Science & Engineering Indicators*: 2016, pp. 92–94.

TABLE 1

Federal Funding for R&D

In 2013, the federal government provided $127 billion in funding for research and development, of which 96 percent went to just seven agencies.

Agency	Funding (billions)	Share of Total
Defense	$63.7	50.0%
Health and Human Services	29.5	23.2
NASA	10.5	8.2
Energy	10.4	8.2
National Science Foundation	5.3	4.2
Agriculture	2.0	1.6
Commerce	1.3	1.0
Transportation	0.9	0.7
Homeland Security	0.7	0.6
Interior	0.7	0.6
Veterans Affairs	0.6	0.5
EPA	0.5	0.4
Education	0.3	0.2
Smithsonian Institution	0.2	0.2
International Development	0.1	0.1
Justice	0.1	0.1
All other agencies	0.3	0.2
Total	$127.3	100.0%

SOURCE: National Science Foundation, *Science & Engineering Indicators 2016* (Arlington, VA: National Science Foundation, 2016), Chapter 4, "Research and Development, National Trends and International Comparisons," p. 71, http://www.nsf.gov/statistics/2016/nsb20161/ uploads/1/7/chapter-4.pdf (accessed May 18, 2016).

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Navy has invested millions of dollars in biofuels that clearly meet a political objective to "jump-start" a domestic biofuel economy rather than meet a strategic advantage.[29] Despite clear direction from Congress that fuels be cost-competitive, the executive branch has camouflaged the costs of the Navy's biofuel program by subsidizing it through the U.S. Department of Agriculture's Commodity Credit Corporation program. While the Navy's price per gallon may appear cheaper, the actual cost to the government is much higher.[30] Once the Defense Department went beyond simply providing for the common defense, it quickly became politicized.

Criterion Two: R&D for Basic Research. Second, federal R&D spending quickly becomes wasteful once it expands beyond the scope of basic science. Basic science is research that has no determined application other than the simple advancement of human knowledge.[31] While basic R&D is not in and of itself a necessary role of the federal government, Americans could decide through the political process to pursue basic science through federal funding where the private sector is not already working. The federal government's role in this scientific research and development should be minimal, fiscally responsible, and apolitical. However, this line has been blurred to the point of no distinction.

Tax dollars are often spent on clearly wasteful government R&D. For example, the National Science Foundation awarded a $1.3 million grant to researchers at the University of Washington to study how koozies insulate a can of beer.[32] While most can agree that tax dollars should not be spent on clearly wasteful projects, the problem of government interference in funding research is much larger and less immediately apparent. The Founders provided for little more in science and technology policy than standardiz-

29. Secretary of the Navy Ray Mabus described the program in 2009 as "leading change," continuing that "moving to biofuels and electric vehicles will benefit the local communities where our bases are located and will spur adoption of similar vehicles in those neighborhoods." Ray Mabus, remarks delivered at Hilton McLean Tysons Corner, McLean, Virginia, October 14, 2009, http://www.navy.mil/navydata/people/secnav/Mabus/Speech/SECNAV%20Energy%20Forum%2014%20Oct%2009%20Rel1.pdf (accessed May 18, 2016).
30. U.S. Government Accountability Office, "Observations on DOD's Investments in Alternative Fuels," GAO–15–674, July 2015, pp. 19–23, http://www.gao.gov/assets/680/671667.pdf (accessed May 18, 2016).
31. National Science Foundation, *Third Annual Report*, 1953, http://www.nsf.gov/pubs/1953/annualreports/ar_1953_sec6.pdf (accessed May 18, 2016).
32. Even though the science of evaporation and condensation is admittedly well understood. The University of Washington researchers said: "The point of the exercise wasn't really to break new ground in atmospheric physics (or in summertime beverage consumption), but 'to improve our intuition about the power of condensational heating.'" Jeff Flake, "Wastebook 2015: The Farce Awakens," Senator Jeff Flake (R–AZ), December 2015, pp. 15–16, http://www.flake.senate.gov/public/_cache/files/03714fa3-e01d-46a1-9c19-299533056741/final-wastebook-2015-pdf.pdf (accessed May 18, 2016).

ing weights and measures, a census, and intellectual property rights.[33] However, the lack of leadership and guiding principles has led to a much larger, poorly rationalized approach to federal R&D at the expense of private innovation and free markets.

The Department of Energy, for instance, is notorious for spending R&D resources on commercial energy technologies that may be promising or exciting but are well beyond the constitutional role of the federal government. In recent years it has offered grants, loans, and loan-guarantee programs to a wide array of energy technologies—from solar panels to advanced nuclear power and electric vehicles—that already have interest and investment from the private sector.[34] The Department of Energy funds four energy innovation hubs with the goal of developing, demonstrating, and commercializing specific energy technologies.[35] It also houses an Advanced Research Projects Agency-Energy (ARPA-E) program, which aims to fund high-risk, high-reward energy projects. However, the Government Accountability Office found that in many cases, ARPA-E was merely subsidizing projects that already had investment from the private sector.[36] Energy is a dynamic, multi-trillion-dollar global industry in which the U.S. is "the world's most attractive market."[37] While some of these projects may be exciting and promising, subsidizing the commercialization of energy technologies is beyond the legitimate scope of the federal government. Further, the next Administration should embrace what history has shown: Innovation in the market is better served by free enterprise.

Part and parcel with this is liberalizing the Department of Energy's 17 national labs. These labs continue to provide high-impact research in the areas of advanced computing, biotechnology, nuclear physics, and material science. However, the current lab infrastructure is plagued by inefficiencies, duplicative regulations, overlapping missions and capabilities across the labs, and micromanagement of research that stifle innovation.[38] Both private-sector access to the labs' assets and research, and lab employees' ability to turn research into market applications are stifled by complex and overly restrictive conflict-of-interest and intellectual property rights regulations. For example, current contract structures between labs and the private sector are complex and inflexible, effectively discouraging private-sector engagement. Draconian intellectual property rules are still on the books in some labs, for instance disincentivizing individuals with patents from working in related fields at a national lab.[39] Individual labs should have greater management independence and management decisions should not be made by bureaucrats in Washington. Further, though action would be required by Congress, the next President should lead the way to consolidate labs and transfer others to non-federal entities, such as states, universities, or the private sector. These reforms will not only better focus the labs on truly national scientific interests, but also make them more efficient, productive, and innovative.[40]

33. Stine, "Science and Technology Policymaking: A Primer," pp. 1–2.
34. Nicolas D. Loris, "Examining the Department of Energy's Loan Portfolio," testimony before the Subcommittee on Oversight, Committee on Science, Space, and Technology, U.S. House of Representatives, March 3, 2016, http://www.heritage.org/research/testimony/examining-the-department-of-energys-loan-portfolio (accessed May 18, 2016).
35. U.S. Department of Energy, "Hubs," http://energy.gov/science-innovation/innovation/hubs (accessed May 18, 2016). See also The Heritage Foundation, *Blueprint for Balance: A Federal Budget for 2017* (Washington, DC: The Heritage Foundation, 2016), p. 44, http://thf-reports.s3.amazonaws.com/2016/BlueprintforBalance.pdf (accessed May 18, 2016).
36. Government Accountability Office, "Department of Energy: Advanced Research Projects Agency-Energy Could Benefit from Information on Applicants' Prior Funding," GAO-12-112, January 2012, http://www.gao.gov/assets/590/587667.pdf (accessed May 18, 2016). See also U.S. Department of Energy, Office of Inspector General, Office of Audits and Inspections, "The Advanced Research Projects Agency–Energy," *Audit Report*, August 2011, http://science.house.gov/sites/republicans.science.house.gov/files/documents/hearings/2011%2008%20DOE%20IG%20ARPA-E%20Audit.pdf (accessed May 18, 2016).
37. SelectUSA, "The Energy Industry in the United States," http://selectusa.commerce.gov/industry-snapshots/energy-industry-united-states (accessed May 18, 2016).
38. Matthew Stepp et al., "Turning the Page: Reimagining the National Labs in the 21st Century Innovation Economy," The Information Technology and Innovation Foundation, The Center for American Progress, and The Heritage Foundation, June 2013, http://www2.itif.org/2013-turning-page-national-lab-executive-summary.pdf?_ga=1.238496128.1484445840.1442263666 (accessed May 18, 2016).
39. For specific problems and recommendations see ibid., pp. 42–54.
40. Ibid.

Government intervention in the development, demonstration, and commercialization of new technologies—whether through federal programs or the national labs—muddles important market signals that are critical to the success of any technology, not just in the energy sector. This is especially the case when there is already investment by the private sector. No matter how diligent or transparent an Administration is, federal funding for R&D beyond the two basic conditions inherently picks winners and losers among companies and technologies. It communicates that a government-backed project is less risky or more promising than ones that do not receive funding. In doing so, this distorts private-sector investment decisions, jeopardizes taxpayer dollars, and encourages political connections over innovation.[41] Ultimately, federal intervention narrows the scope of potential innovation.

Bringing Accountability to Regulatory Science

While R&D may be the most expensive aspect of federal science and technology to the taxpayer, regulatory science is perhaps the most impactful and invasive to the average American family and business, imposing far more costs on the economy.[42] Nearly every executive agency must develop and compile the underlying science to justify regulatory action. Congress, the President, and individual executive agencies have established an abundance of policies, procedures, and directives for the use of scientific research and data to ensure the integrity and transparency of the rulemaking process. However, they are full of loopholes and lack meaningful accountability mechanisms—which allows agencies to exploit these guidelines by interpreting them as they see fit. In order to improve the quality and transparency of regulatory decisions in science policy, the next President should exercise clear, consistent, and vigilant leadership to codify reforms.

Executive branch agencies are required by Executive Order 13563 to base regulation on "the best available science." Regulators must comply with guidelines issued by the Office of Management and Budget's Office of Information and Regulatory Affairs (OIRA), which must approve new major rules before they can take effect. Two principal statutes govern the use of scientific research and data in rulemaking. The Information Quality Act directed the OMB to issue "policy and procedural guidance to Federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by Federal agencies."[43] Although this was a positive step toward improving accountability in science policy, the guidelines allow federal agencies to develop their own rules for information quality, including procedures for managing public requests for corrections. This severely limits the Information Quality Act's utility to Americans affected by regulations as agencies are given wide discretion in and out of the legal system.[44]

Similarly, the Data Access Act directs the OMB "to require Federal agencies to ensure that all data produced under an award will be made available to the public through the procedures established under the Freedom of Information Act."[45] However, the OMB has interpreted this charge so narrowly as to restrict their application to agencies or usefulness to the public.[46] Consequently, executive agencies all too

41. Jack Spencer, "Seven Reasons Loan Guarantees Are Bad Policy," Heritage Foundation *Issue Brief* No. 3882, March 20, 2013, http://www.heritage.org/research/reports/2013/03/seven-reasons-loan-guarantees-are-bad-policy.
42. James L. Gattuso and Diane Katz, "Red Tape Rising 2016: Obama Regs Top $100 Billion Annually," Heritage Foundation *Backgrounder* No. 3127, May 23, 2016, http://www.heritage.org/research/reports/2016/05/red-tape-rising-2016-obama-regs-top-100-billion-annually.
43. Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106–554, §515.
44. Robert Gordon and Diane Katz, eds., *Environmental Policy Guide: 167 Recommendations for Environmental Policy Reform* (Washington, DC: The Heritage Foundation, 2015), pp. 39–40, http://thf_media.s3.amazonaws.com/2015/pdf/EnvironmentalPolicyGuide.pdf. See also U.S. Government Accountability Office, "Information Quality Act: Actions Needed to Improve Transparency and Reporting of Correction Requests," GAO–16–110, December 2015, http://gao.gov/assets/680/674386.pdf (accessed May 18, 2016).
45. Omnibus Consolidated and Emergency Supplemental Appropriations Act of 1999, Public Law 105–277.
46. Gordon and Katz, *Environmental Policy Guide*, pp. 39–40. Richard Belzer, "Fostering Quality Science at EPA: Perspectives on Common Sense Reforms –Day II," testimony before the Subcommittee on Energy and the Environment, Committee on Science, Space, and Technology, U.S. House of Representatives, February 3, 2011, p. 10, https://science.house.gov/sites/republicans.science.house.gov/files/documents/hearings/HHRG-112-SY20-WState-RBelzer-20120203.pdf (accessed May 18, 2016).

often do not abide by the plain meaning of rigorous information-quality assurance and public access to taxpayer-funded research and data.

Early in his first term, President Barack Obama pledged to uphold scientific integrity. In a memo to all executive agencies he stated:

> The public must be able to trust the science and scientific process informing public policy decisions. Political officials should not suppress or alter scientific or technological findings and conclusions. If scientific and technological information is developed and used by the Federal Government, it should ordinarily be made available to the public. To the extent permitted by law, there should be transparency in the preparation, identification, and use of scientific and technological information in policymaking. The selection of scientists and technology professionals for positions in the executive branch should be based on their scientific and technological knowledge, credentials, experience, and integrity.[47]

The meaning was clear; the execution was hardly so. As directed, OSTP Director John Holdren coordinated agency-wide guidance on ensuring scientific integrity and required individual agencies to report progress to that end.[48] However, it took nearly two years for the OSTP to develop these guidelines. Moreover, these guidelines gave so much room that they essentially left standards and enforcement up to agency discretion.[49] As former OIRA economist Richard Belzer testified before Congress, the Holdren memo

> calls for "policymakers [to] involve science and technology experts where appropriate," without clearly stating the circumstances where it wouldn't be.... It calls for "independent peer review by qualified experts," but only "where feasible and appropriate." The guidance says "political officials should not suppress or alter scientific or technological findings," but it does not actually generally prohibit this practice. Only agency public affairs officers are expressly forbidden from doing this.[50]

These and others are loopholes that agencies routinely exploit with egregious consequences for sound policy. Though not unique to the Environmental Protection Agency (EPA), the agency provides an illustrative example. In October 2015, the EPA again tightened air-quality standards on ground-level ozone, adding $1.4 billion to annual compliance costs.[51] Administrator Gina McCarthy has defended the rule by stating that she "followed the science."[52] Yet the EPA has failed to address glaring discrepancies with the rule's underlying science[53] and has even misrepresented data from its own scientists.[54] Instead, the EPA refuses to

47. News release, "Memorandum for the Heads of Executive Departments and Agencies 3-9-09," The White House, March 9, 2009, https://www.whitehouse.gov/the-press-office/memorandum-heads-executive-departments-and-agencies-3-9-09 (accessed May 18, 2016).
48. John Holdren, "Memorandum for the Heads of Executive Departments and Agencies," The White House, December 17, 2010, https://www.whitehouse.gov/sites/default/files/microsites/ostp/scientific-integrity-memo-12172010.pdf (accessed May 18, 2016).
49. Belzer, "Fostering Quality Science at EPA," pp. 2–3.
50. Ibid.
51. James McCarthy, "Ozone Air Quality Standards: EPA's 2015 Revision," Congressional Research Service *Report for Congress*, January 25, 2016, pp. 15–16, https://fas.org/sgp/crs/misc/R43092.pdf (accessed May 18, 2016).
52. McCarthy, "U.S. EPA: We Need Tougher Ozone Standards."
53. For example, Michael Honeycutt, "Will EPA's Proposed New Ozone Standards Provide Measurable Health Benefits?" Texas Commission on Environmental Quality," October 2014, http://www.tceq.state.tx.us/publications/pd/020/2014/will-epas-proposed-new-ozone-standards-provide-measurable-health-benefits (accessed May 18, 2016).
54. For example, the EPA relies heavily on an epidemiological study conducted by William Adams (contracted by the EPA). The study's conclusions did not substantiate the need for a stricter ozone standard as the EPA proposed. However, the EPA conducted a re-analysis of Adams's data to defend its decision—which has not been released to the public nor peer reviewed, and Adams himself attempted to clarify the EPA's misrepresentation of his data. See John Engler, "Public Comment on the Environmental Protection Agency Proposed Rule: National Ambient Air Quality Standards for Ozone," October 9, 2007, Docket No. FPA-HQ-OAR-2005-0172, pp. 17–19, https://www.regulations.gov/#!documentDetail;D=EPA-HQ-OAR-2005-0172-4861 (accessed May 18, 2016). See also W. C. Adams, "Public Comment on the Environmental Protection Agency's Proposed Rule: National Ambient Air Quality Standards for Ozone," March 14, 2011, https://yosemite.epa.gov/sab/sabproduct.nsf/AC687E5ADBECE132852578540062C5BB/$File/API+Comments+-+Steichen.pdf (accessed May 18, 2016).

release the underlying (taxpayer-funded) data for its conclusion to tighten the standard. Consequently, other experts cannot test and attempt to reproduce the EPA's work. In August 2013, the House Committee on Science, Space, and Technology issued a subpoena for access to the data, after repeated requests for access to the data which the EPA promised in September 2011. The EPA has yet to release the data, claiming the need to protect sensitive personal information, even though such information likely could be redacted.[55]

The lack of transparency and integrity in science policy allows policymakers to interpret congressional guidelines according to their own interests. This enables corrupt bureaucrats to create a scientific basis in order to justify regulatory conclusions that serve their own agenda. Though Congress bears some responsibility for its failure to write clear and strict standards, the executive branch is also at fault for its unwillingness to aggressively pursue scientific transparency and integrity.

Conclusion

Science and technology policy involves all three branches of the federal government. However, the next President has an important role to play in bringing leadership and accountability to a federal enterprise that has become unwieldy, poorly rationalized, and unaccountable. The next President should downsize the bureaucracy through which he or she receives science and technology advice by eliminating the OSTP. He or she should also reform the bureaucracy that drives science and technology policies—specifically by rationalizing the billions of dollars in federal research and development, and by introducing strict scientific transparency and integrity to regulatory science. Leadership in these areas would appropriately reduce the size and scope of government to the benefit of federal taxpayers and create more room for competition in the free market for scientific research and technology advancements.

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55. Committee on Science, Space, and Technology, "Full Committee Hearing: Strengthening Transparency and Accountability within the Environmental Protection Agency," U.S. House of Representatives, November 14, 2013, video, at 15:30 minute mark, https://science.house.gov/legislation/hearings/full-committee-hearing-strengthening-transparency-and-accountability-within (accessed May 18, 2016).