



Counterpoint: Heritage Foundation Backgrounder

Last week, the Heritage Foundation released a Backgrounder Report calling for dramatic and targeted cuts to the Department of Energy budget outlays.¹ The report suggests that innovation spending increases at DOE are dangerous contributors to the national deficit and inferior financing mechanisms to private sector investment in energy technologies.

The Heritage proposal calls for (1) fully eliminating the Office of Energy Efficiency and Renewable Energy, slashing the \$3.2 billion budget, and eliminating proposed advanced nuclear energy technology programs from the Office of Nuclear Energy; (2) eliminating the Innovative Technology Loan Guarantee Program and reducing other applied programs like the Office of Nuclear Energy; (3) cutting \$1.59 billion from the Office of Science, including the elimination of two of the four Energy Innovation Hubs, elimination of the 46 Energy Frontier Research Centers (EFRCs), elimination of the Workforce Development for Teachers and Scientists Program, and a broad range of other cuts to basic energy sciences; (4) eliminating the power marketing administrations; and (5) cutting the administration's FY2012 budget request for ARPA-E from \$650 million to \$300 million. But their report has several inconsistencies and inaccuracies, which we list in detail here below.

- **Heritage cites several ventures as evidence of independent private sector efforts to develop next generation energy technologies that in fact each received public support.**

General Fusion. The report heralds the Canadian firm General Fusion as a “prime example” of the private sector investing in pre-commercial technologies. General Fusion has in fact received roughly 60 percent of its funding from government agencies.²

Biofuels Research at the University of Massachusetts Amherst. The biofuels research program at the University of Massachusetts Amherst, also called TIMBR, is a multidiscipline, public-private technology innovation program. While Heritage lauds the Center for attracting private investment from the likes of Caterpillar and GM, the think tank’s report sidesteps the fact that the program receives significant funding and support from DOE and NSF.³ In fact, universities in total receive over 60 percent of their R&D support from local, state, and federal governments, according to the NSF Science and Engineering Indicators report.⁴

George Tech Enterprise Innovation Institute. The Georgia Tech Enterprise Innovation Institute, or EI², is another institution cited by the Heritage report as an example of compelling private sector activity in the energy field, in this instance workforce development. However, EI² receives public funding, and a key aspect of their operations is matching companies with government contracts.⁵

Tri Alpha Energy. Tri Alpha Energy raised “\$50 million from venture capitalist firms” to support research in fusion technology. Support for their operations and programs also came from NASA, NSF, and DOE.⁶

Helion Energy. Helion Energy, cited by Heritage as a private company seeking capital funds to build a full-scale model of its fusion reactor, ostensibly without support from the federal government, is based on technology pioneered by University of Washington Professor John Slough, whose Plasma Dynamics Lab lists as its funding sources the United States Department of Energy, NASA, and the US Air Force.⁷

Heritage cites each of these examples as supposed evidence of the proficiency of the private sector in advancing pre-competitive and advanced energy technologies to market on its own. In reality, all of the companies and research ventures above are prime examples of the kind of productive partnership between private *and public* sectors that is the true face of American innovation – a partnership that Heritage would dismantle. This is the kind of public support for emerging technologies and private sector entrepreneurs that gave birth to everything from jet engines to the Internet, microchips to GPS, and countless biomedical and agricultural innovations, each of which fueled American economic growth and prosperity.⁸ And unless Heritage has its way, this is the kind of key partnership between public and private sectors that could give rise to new groundbreaking innovations in the energy sector that will strengthen American energy security, launch new high-tech industries, and contribute to another century of sustained national prosperity

- The report wrongly suggests that DOE budget expenditures are prime targets for substantial deficit reduction.

Cutting \$6 billion, or approximately 23 percent, from the FY2010 DOE budget, as Heritage proposes, would reduce the \$1.5 trillion federal deficit by a mere four-tenths of one percent.

- The report uses out-of-context figures to exaggerate the relative magnitude of DOE’s budget.

Heritage writes that DOE’s budget experienced a “staggering” increase in size from \$15 billion to \$26.4 billion over the last decade. To call these figures “staggering” is misleading. The DOE’s budget is the fourth smallest of the federal executive departments (only Treasury, State and Commerce have smaller ones), and it compares to \$854 billion at Health and Human Services and \$691 billion at the Department of Defense. The budgets for HHS and DOD each more than doubled in size over the same ten-year period, adding over half a trillion dollars in government spending, compared to a roughly \$10 billion increase at DOE.⁹

- The report is inconsistent in its support and understanding of the DOE's role in enhancing energy security.

In the "Talking Points" sidebar of the report, Heritage claims that DOE should stick to its "traditional mission of promoting national and economic energy security." Yet later in the report they dismiss such efforts, such as advancing biofuels to replace the nation's reliance on imported fossil fuels, as "either protectionist or attempts to deploy uncompetitive technologies."

- The report assumes a zero-sum competition between government and private investors rather than acknowledging the long and successful history of public-private partnerships.

The report claims that by "forcing government-developed technologies into the market, the government diminishes the role of the entrepreneur and crowds out private sector investment." Evidence from various DOE programs refutes this claim. ARPA-E does not force government-developed technologies into the market, but instead provides financing for pre-commercial private sector and university ventures that invest in technological innovation.¹⁰ Similarly the National Renewable Energy Laboratory's pre-commercial research into thin-film solar technology was adopted and commercialized by First Solar, now the world's leading private thin film solar company.¹¹

- Selective and prejudicial history is applied to suggest that government research has little to no commercial aim or value.

Citing the examples of the Internet, computer chips, and GPS, the report claims, "Government programs that become commercial successes were not intended to meet a commercial demand." There are two problems with this. First, this is not a reason to eschew federal funding for future basic research and pre-commercial technology since, as Heritage acknowledges, such investments *have* resulted in technologies that launched entire new industries, fueled decades of American prosperity, and improved the lives of millions. Second, this claim is not universally true. For example, nuclear power, a technology born out of the government-organized Manhattan Project and supported by the precursors to the DOE, relied on tremendous federal support for its development and deployment, and was explicitly developed for commercial use. Private companies like General Electric and Westinghouse coordinated closely to guarantee that the government would support their high-risk, advanced technology ventures, and the Atomic Energy Commission was set up to ensure the safety and economic viability of the industry.

- The report relies on the unfounded assumption that the private sector is, and should be, largely responsible for energy research, commerce, and infrastructure.

Heritage adamantly stands by its assertion that, "The reality is that when it comes to energy policy, the free market works." In fact, few industries are more entrenched in a system of government support, insurance, regulation, and protection than energy. Over a century's worth of subsidizing fossil energy sources—not to mention roads, vehicle development and manufacturing, and

transmission/distribution infrastructure—have underwritten the steady development and improvement of conventional energy sources and embedded coal, oil, and natural gas as the favored national energy inputs. In the case of nuclear power, the only new commercial energy generation technology to emerge and scale up significantly in the 20th century, government insurance, liability limitation, and loan guarantees have allowed private financiers the certainty and stability to invest in nuclear energy projects, which typically have high up-front capital cost and long life spans. Military resources, including the lives of American soldiers, are expended in the protection of foreign energy reserves and the shipping lanes that bring them to American markets. The private sector does not and cannot provide these services. The claims that the energy sector is a “free market” and that advanced energy technologies will achieve an efficient critical mass through private investment alone are simply wrong.

- Heritage acknowledges the role of government in advancing a national interest not met by the private sector, yet claims that the government is not equipped to do so.

Heritage employs two conflicting rationales in calling for cuts to various innovation programs. “Government research programs,” Heritage admits, “should advance a specific critical national interest that is not being met by the private sector.” Elsewhere in the report, however, the think tank states that “the government is not equipped to determine commercial viability and can retard the process by misallocating resources to inefficient uses.” The Heritage Foundation first admits that the government plays a critical role in fixing key market failures and advancing critical national interests, but then claims that the private sector is the more effective and appropriate venue to invest in new energy research, apparently assuming that the market will somehow fix itself and overcome the inherent market failures and limitations that now constrain it.

Heritage’s logic is self-contradictory, and evidences a misunderstanding of the many market failures constraining the development and adoption of new, advanced energy technologies. In reality, market failures plague the energy innovation process at each stage, from lab to market launch.¹² Spillover risks, uncertain returns, and long lead-times all constrain or outright prevent private firms from investing in breakthrough energy innovations. Furthermore, first-of-a-kind advanced energy technologies must typically prove themselves at full commercial scale before attracting traditional financiers. Yet demonstrating large-scale technologies – such as advanced modular nuclear reactors, floating deepwater wind turbines, or carbon capture and storage technologies – typically costs more than venture capitalists can finance alone, leaving a large ‘Valley of Death’ that kills off many promising technologies before they can enter the marketplace. Overcoming these persistent market failures to help advance a portfolio of advanced energy technologies and provide the secure, affordable, and healthy energy needed to fuel the economy is clearly in the national interest, and is the proper role for government energy and innovation programs.

- Heritage is inconsistent in applying their support or opposition to federal programs supporting clean energy innovation.

While the Heritage Foundation supports an ongoing role for the Advanced Research Projects Agency-Energy, lauding the agency’s focus on “transformational energy research that industry by itself

cannot and will not support," the Heritage brief simultaneously calls for the dismantling of budgets for the DOE Office of Science, including the Energy Frontier Research Centers program, which pursues basic energy research at the frontiers of energy science, the kind of high-risk, long-term research with very uncertain payoffs that private sector firms cannot and do not pursue. The other DOE energy and innovation programs targeted by Heritage also work to fill critical private sector gaps and overcome the market failures listed above.

■ **Heritage wrongly suggests that the private sector invests sufficiently in energy innovation.**

Heritage writes, "Even for technologies that are not yet commercially feasible, the private sector is making financial investments." But the fact is that for decades the private sector has consistently underinvested in energy research and development (R&D). In fact, the energy industry invests just 0.3 percent of its revenues back into R&D, while most innovative industries such as Information Technology and Biotechnology reinvest 5-20 percent of their revenues into new product development and innovation.¹³ The gap is so significant that Bloomberg New Energy Finance recommended a number of government policies to support technology demonstration and commercialization, such as the creation of a Clean Energy Deployment Administration and additional technology development through DOE.¹⁴

The Information Technology and Innovation Foundation (ITIF) is a non-partisan research and educational institute – a think tank – whose mission is to formulate and promote public policies to advance technological innovation and productivity internationally, in Washington, and in the states. Recognizing the vital role of technology in ensuring prosperity, ITIF focuses on innovation, productivity, and digital economy issues. For more information about ITIF, please visit <http://itif.org>.

Breakthrough Institute is a leading independent public policy research institute, based on Oakland, California. Since 2002, Breakthrough's Energy and Climate Program has worked to advance key federal investments to make clean and low-carbon energy technologies cheap and abundant, strengthen American economic competitiveness and energy security, and slow global warming. For more information about the Breakthrough Institute, please visit <http://thebreakthrough.org>.

Americans for Energy Leadership is an organization that works to build support for federal energy innovation policy, educate the nation's leaders and general public about the role of strategic public-private investments in technology, and foster the next generation of energy policy leaders. For more information about AEL, please visit <http://leadenergy.org>.

Endnotes and citations

¹ Loris, Nicolas. The Heritage Foundation. "Department of Energy Spending Cuts: A Guide to Trimming President Obama's 2012 Budget Request." April 2011. <http://www.heritage.org/Research/Reports/2011/04/Department-of-Energy-Spending-Cuts-A-Guide-to-Trimming-President-Obamas-2012-Budget-Request>

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⁴ National Science Foundation. "Science and Engineering Indicators: 2010." January 2010. <http://www.nsf.gov/statistics/seind10/>

⁵ Georgia Tech Enterprise Innovation Institute 2009 Annual Report. <http://innovate.gatech.edu/about-us/>

⁶ Kanellos, Michael. "Rumor: Secretive Tri Alpha Energy to Show Off Fusion Technology Next Year." Greentech Media. November, 2010. <http://www.greentechmedia.com/green-light/post/rumor-secretive-tri-alpha-energy-to-show-off-fusion-technology-next-year/>

⁷ Plasma Dynamics Lab. Department of Aeronautics and Astronautics. University of Washington College of Engineering. <http://www.aawashington.edu/research/plasmaDynamics/>

⁸ The Breakthrough Institute. "Where Good Technologies Come From: Case Studies in American Innovation." December 2010. http://thebreakthrough.org/blog/2010/12/american_innovation.shtml

⁹ DOD's budget information can be found at <http://comptroller.defense.gov/Budget2011.html>. DOD's budget was \$316 billion in FY2001 and is \$691 billion for FY2011. HHS's budget information can be found here <http://www.hhs.gov/asfr/ob/docbudget/>. HHS's budget was \$421 billion in FY2001 and is \$854 billion for FY2011.

¹⁰ Overview of the ARPA-E Award Contracting Process for Selectees. <http://arpa-e.energy.gov/FundingAgreements/Overview.aspx>

¹¹ The Breakthrough Institute. "Where Good Technologies Come From: Case Studies in American Innovation." Op cit. endnote 8.

¹² Charles Weiss and William Bonvillian. *Structuring an Energy Technology Revolution*. MIT Press, April 2009. <http://mitpress.mit.edu/catalog/item/default.asp?ttype=2&tid=11808>

¹³ *ibid.*

¹⁴ Bloomberg New Energy Finance. "Crossing the Valley of Death: Solutions to the next generation clean energy clean energy project financing gap." June 2010. <http://bnf.com/WhitePapers/download/29>