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All About the Fundamentals:

Three Misconceptions of the Heritage Foundation's Deficit/Energy Proposal

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The Heritage Foundation recently put thoughts-to-paper as to one way it would start to address the budget deficit and manage the national debt.[1] In a nutshell, the Heritage Foundation calls for a near complete dismantling of the Department of Energy. In fact, if Heritage had it their way, their assessment of DOE programs "could very well result in the elimination of the entire department." The Heritage Foundation proposal displays a fundamental lack of understanding of where technological innovation comes from and is thus a misguided approach to America's energy, economic and fiscal policy.

Heritage's proposal would be nothing less than a devastating blow to American energy innovation efforts, and thus to the country's long-term energy security, economic competiveness, and fiscal health.

SUMMARY OF THE HERITAGE FOUNDATION'S PROPOSAL

In particular, the Heritage policy brief calls for:

- Eliminating the Office of Energy Efficiency and Renewable Energy.
- Eliminating all programs at the Office of Fossil Energy except the Strategic Petroleum Reserve.
- Eliminating proposed programs within the Office of Nuclear Energy aimed at advancing new Small Modular Reactor designs, and instead uses some of those funds to support NRC advanced reactor licensing.
- Eliminating the Innovative Technology Loan Guarantee Program aimed at supporting the commercialization of new, innovative energy technologies.[2]

- Eliminating the Energy Innovation Hubs for Energy Storage, Nuclear Modeling and Simulation, and Fuels from Sunlight. We assume the proposal would also not fund the additional Hubs proposed in the President's FY2012 request.
- Cutting the Office of Science by 30% compared to the President's FY2012 request and 22% compared to FY2011 appropriations.
- Cutting the Advanced Research Projects Agency – Energy (ARPA-E) by 65% relative to President Obama's FY2012 request.
- Eliminating all 46 Energy Frontier Research Centers (EFRCs), collaborative basic research centers originally proposed by President George W. Bush's Department of Energy to perform cutting edge energy science.

In total, Heritage proposes an approximately $6 billion (or 50 percent) cut compared to the President's FY2012 budget request for DOE energy programs. These cuts would amount to an additional 43 percent ($3.8 billion) cut to the recently passed continuing resolution that already made cuts to a number of energy innovation agencies.[3] As such, Heritage's proposal would be nothing less than a devastating blow to American energy innovation efforts, and thus to the country's long-term energy security, economic competiveness, and fiscal health.

The consistent themes used to justify these cuts can be categorized into three broad misconceptions (or outright misunderstandings):

1. THE PROPOSAL FAILS TO MEANINGFULLY REDUCE THE BUDGET DEFICIT NOW OR IN THE FUTURE.

In advocating that the government cuts nearly half of the FY2012 budget request for DOE energy programs, Heritage's stated goal is to alleviate, "the huge debt burden that the government is placing on future generations, and thus [reign] in federal spending." Their proposal fails to meet this goal for two reasons.

First, the DOE represents a tiny portion of the federal budget and contributes little to the budget deficit and national debt.

Even the proportionately large cuts to DOE energy and innovation programs proposed by Heritage would do essentially nothing to set the United States on a fiscally responsible path. Given the estimated FY2011 budget deficit of $1.5 trillion, the proposed cuts to DOE energy and innovation programs would reduce the deficit by less than one half of one percent (0.4 percent)–hardly a serious plan to manage our national debt.[4]

The proposal states that DOE's budget grew a "staggering 76 percent increase in only one decade" to $26.4 billion in FY2010. Yet even at this level DOE's budget is the fourth *smallest* department of the executive branch (only bigger than the Departments of State, Commerce, and Treasury). Indeed, DOE's budget is dwarfed by those of the Department of Health and Human Services ($854 billion) and the Department of Defense ($691 billion), which each saw their budgets increase by 100 percent in the last decade.[5] Furthermore, the large majority of DOE's budget is actually dedicated to cleaning up after and safely managing the nation's nuclear weapons. Less than one-third of the agency's

overall budget is dedicated to energy and innovation programs, yet it is this tiny portion of the federal budget that Heritage puts on the chopping block.

Second, restoring fiscal balance will not be achieved through cuts to non-defense discretionary spending, particularly through cuts to productive investments in America's economic future.

A truly responsible strategy to restore fiscal balance must focus on the key drivers of the national debt, including responsible cuts in defense spending and entitlement reform, and will depend crucially on achieving higher rates of economic growth.

The Congressional Budget Office estimates that every extra 0.1 percent increase in the GDP growth rate reduces the projected 2021 budget deficit by $68 billion through increasing tax revenue.[6] Boosting economic growth, thus spurring innovation, is a vital mechanism for reducing the deficit. Throughout America's history, productive federal investments in cutting edge science and technology development supported the birth of new technologies and industries. It was investments in technologies from microchips and jet engines to biotechnology and the Internet, which have fueled America's sustained prosperity through the 20th century.[7] Given this long history of American innovation, Former Director of the CBO and the Office of Management and Budget (OMB) Dr. Alice Rivlin has rightly observed that that government support for innovation is key to solving the debt crisis:

> True, we must reduce low-priority discretionary spending, both defense and domestic; slow the projected growth of Medicare and Medicaid; and restore Social Security to fiscal soundness. But we also need to care for an aging population and invest in the skills, research and modern infrastructure that power economic growth.[8]

If cuts are made to key national investments in new science and technology, it will retard economic growth and actually exacerbate the deficit challenge.

Heritage's belief that taking a hatchet to the budgets of key energy technology and innovation programs will help alleviate our debt therefore evinces a basic misunderstanding of the difference between government spending and productive public investment. If cuts are made to key national investments in new science and technology, it will retard economic growth and actually exacerbate the deficit challenge.

New advanced energy technologies in particular offer a key opportunity for future economic growth that the United States must quickly develop in the face of aggressive foreign competition. The global energy market is a $6 trillion market. As global energy demand increases substantially over the next 40 years and more nations increasingly seek to transition to clean energy technologies, developing reliable and affordable advanced energy technologies provides one of the most significant market opportunities of the 21st century.

In fact, while Heritage proposes cuts to the heart of America's energy innovation system, many of America's international competitors are quickly developing advanced energy technology sectors aided by significant public investment and public-private partnerships. Countries like China, Germany, Japan, and South Korea are actively engaged in the emerging clean energy sector and have quickly become leaders in developing and

manufacturing new energy innovations.[9] New companies, jobs, higher wages, and export opportunities are growing globally in the clean energy sector with or without U.S. involvement. To keep at the cutting edge of technological innovation and rev up the growth engine, the United States must play an active role in the sector. Cutting key energy innovation programs that are helping the private sector accelerate the development of breakthrough clean technologies would immediately put the United States behind at a time where we need more economic growth, not less. Heritage's proposal should therefore be described as pro-deficit, as it would do harm to future economic growth while having little effect on the budget deficit.

2. HERITAGE FAILS TO UNDERSTAND WHERE TECHNOLOGICAL INNOVATIONS COME FROM.

To meet our energy challenges and grow the economy, the United States must develop and widely deploy next generation energy technologies. In this regard, Heritage makes two faulty assumptions that would hamstring U.S. technological innovation.

In fact, the energy sector is anything but free, and has always been characterized by extensive regulations and subsidies, natural monopolies, and other divergences from the free-market ideal held by Heritage.

First, Heritage wrongly assumes that "when it comes to energy policy, the free market works" and is best suited to develop new technologies.

In fact, the energy sector is anything but free, and has always been characterized by extensive regulations and subsidies, natural monopolies, and other divergences from the free-market ideal held by Heritage. Governments have always been engaged in the energy sector, subsidizing new supplies and supporting new technologies, regulating utilities, and ensuring the safety, security, and stability of our nation's critical energy system. Just as government policy and investment helped build the energy infrastructure we have today, so too will government investment be necessary to reduce America's vulnerability to rising and volatile fossil energy prices. That includes robust support for secure, affordable, and clean advanced energy technologies.

It is widely acknowledged that the "free market" doesn't take into account either the energy insecurity plaguing our nation today, or the longer-term threat posed by global climate change. These are classic examples of what economists call externalities. Absent public policy intervention, markets will underperform in the presence of such externalities, and our national security, economic vitality, and public health will suffer. Policy support is particularly important in the energy sector because energy is a commodity and competes on cost alone. The inherent biases of the "free market" automatically make fossil fuels the least cost choice. So, for any new technologies to compete, additional support is necessary to drive innovation to the point where the new, cleaner, domestic technologies can compete in the marketplace without ongoing subsidies.

Further evidence against the idea that there is a free market in the energy sector is that from 2002 to 2008 fossil fuels received $72 billion in subsidies compared to $29 billion given to renewable sources. Fossil fuels have used their years of subsidized profits to entrench themselves politically, continually fighting regulations to maintain high profits. We applaud Heritage for agreeing that we should eliminate the tax breaks for fossil fuel companies, but this is only a small step and much more support is needed to overcome the fundamental bias towards fossil fuels in the energy market.

The reality is that DOE's investment in energy innovation doesn't pick favored technologies. For example, ARPA-E invests in a broad portfolio of technologies and firms and hasn't picked one national champion in the advanced battery industry, for example—nor should it.

Second, Heritage ignores the long history of public support for innovation and assumes the private sector will invest sufficiently in energy innovation.

Heritage writes, "Government research programs should advance a specific critical national interest that is not being met by the private sector." We agree. The problem is by arguing that most, if not all, energy research and technology development can be done by the private sector, Heritage displays a fundamental misunderstanding of innovation in the energy sector.

For decades, the energy sector has consistently underinvested in R&D. In fact, the energy industry invests less than 0.3 percent of revenue back into R&D when most competitive and healthy industries, including the Information Technology and Biotechnology sectors, invest 5 – 20 percent of revenue into new product development and innovation.[10] At best, the ability of the entrenched energy sector to develop new technologies is significantly limited. This widely acknowledged market failure is a fundamental reason why government support for advanced energy technology is necessary. Indeed, such support meets Heritage's own criteria of "advancing a specific critical national interest that is not being met by the private sector."

Market failures plague the energy innovation process at each stage of development, from lab to market launch. Spillover risks, uncertain returns, and long lead-times all prevent private firms from investing in breakthrough innovations that may hold the key to clean, abundant and secure energy supplies. First-of-a-kind advanced energy technologies must typically prove themselves at full commercial scale before attracting traditional financiers, yet large-scale demonstration projects typically cost 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. That is why only an active partnership between both public and private sectors can secure the nation's energy future.

Heritage writes that DOE's energy programs, including even the typically non-controversial basic science programs in the Office of Science, "are clear illustrations of the kinds of activities the DOE should *not* be funding—because they seek to advance specific technologies and goals, such as photovoltaics, batteries, nuclear energy…that are much better suited to the private sector." Echoing a familiar talking point, they write that such funding amounts to "picking winners and losers."

The reality is that DOE's investment in energy innovation doesn't pick favored technologies. For example, ARPA-E invests in a broad portfolio of technologies and firms and hasn't picked one national champion in the advanced battery industry, nor should it.[11] Rather, the agency is identifying technical opportunities and private funding gaps, supporting a wide array of R&D on technologies at many companies, and allowing winners to emerge by actively cultivating dynamic competition. Other programs like the targeted Innovation Hubs fund teams of experts to knock down key hurdles in energy science and pre-commercial technology development to allow the private sector to commercialize the technologies.[12] In most cases, the technologies are developed in partnership with the private sector.[13] Many ARPA-E projects are leveraging up to four dollars of private

investment for every $1 ARPA-E invests, helping spur business development and job growth.[14] This sets a technical foundation upon which private entities can build from. The evidence shows that DOE isn't diminishing "the role of the entrepreneur and crowding out private-sector investment," it's supporting and complementing it.[15] Heritage itself is inconsistent and confused on this point, as their proposal seems to arbitrarily recommend cutting the Energy Frontier Research Center program – which funds basic science ventures with long-term, uncertain paybacks that the private sector cannot and will not invest in – yet recommends keeping the technology development-based ARPA-E – which actively supports translational research efforts pursued by private sector and university research teams.

The DOE's investments in energy innovation are based on a century's worth of lessons learned from successful methods of government support for and development of breakthrough technologies.

The DOE's investments in energy innovation are based on a century's worth of lessons learned from successful methods of government support for and development of breakthrough technologies. As Heritage acknowledges, government investment has a long and successful history in developing technologies that later became commercial successes, such as the Internet, computer chips, and GPS (Heritage could have also mentioned jet engines, airplanes, nuclear energy, wind power, numerous biomedical and agricultural innovations, and so on). In all of those cases, the government acted as either an initial funder or early demanding customer for the technology before it was cost-competitive in the marketplace. In many of these cases, private companies coordinated closely.[16]

Yet in spite of their recognition of this history, Heritage resists federal investment in energy innovation because, "Government programs that became commercial successes were not intended to meet commercial demand." This is not universally true. 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 bankroll their high-risk ventures, and the Atomic Energy Commission was set up to ensure the safety and profitability of the industry. The same is true of the DOE's pioneering efforts in the pre-commercial development of thin-film solar energy technology, efforts that, by design, went on to be commercialized by a number of American firms, including world-leading solar company First Solar. And the national network of land grant colleges and agricultural extension services established by Abraham Lincoln in the 1860s was explicitly designed to pursue agricultural research in close coordination with the needs of American farmers, leading to numerous commercial practices diffused throughout the nation's farms and forests.[17]

Heritage also writes that "It could be argued that government can have a role in basic research that ultimately may have commercial value—but that should not be the purpose of the research." Yet this is reductive. Advancements in technologies like batteries and solar power are needed not simply for "commercial value"; their adoption also has widespread and measurable public benefits, such as cleaner air and improved public health, enhanced military capabilities, and reduced economic vulnerability to the volatility of global oil markets.

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Indeed, there is a strong tradition of the federal government assisting in the commercialization of technologies essential to the nation's well being. From disruptive energy technology development like nuclear power to the NIH's work on both the R&D and commercialization of life saving drugs, the government clearly has a role in advancing technologies that contribute to the national good.

Even Heritage's examples of companies defying the need for government energy research actually demonstrate the importance of an active partnership between private and public sectors. General Fusion, while not even being a U.S. company (they're Canadian-based), receives 60 percent of its funding from the Canadian government for their research, not zero, as Heritage falsely claims.[18] Tri Alpha Energy's theoretical fusion technology comes from government supported university research.[19] In a similar sleight of hand, Heritage only lists the private companies involved in the biofuels research consortia at the University of Massachusetts at Amherst, but conveniently leaves out the significant support from DOE, NASA, and NSF.[20] We agree that the Georgia Tech Enterprise Innovation Institute, which Heritage lauds, is a great example of business development, but it's also a great example of public-private partnership.[21] And listing nuclear technology as an example of not needing public support is far from accurate - advanced reactor companies (using designs developed at the National Laboratories or through government-funded university research or via contracts with the United States Navy) are conducting partnerships with DOE to demonstrate their new technologies to help scale up their designs. Without such a partnership there wouldn't be an emerging advanced reactor industry. A close examination of successful hi-tech energy enterprises reveals the importance of DOE support, basic research, and partnerships in attaining market success.

3. THE PROPOSAL IGNORES THE IMMEDIACY AND ENORMITY OF U.S. ENERGY CHALLENGES.

America's current energy posture presents us with a number of immediate challenges including the need for energy independence, stabilizing energy prices and reducing the risks posed by climate change. The Heritage proposal does nothing to deal with these threats, deciding to instead stick with the status quo.

While the piece does well to mention energy security – or our reliance on imported oil and economic vulnerability to volatile global oil prices – its recommendations would undermine the very concept.

The Department of Defense has been the first to recognize the important role that renewable technologies will have to play in successfully executing their mission. Whether it be through their investments in renewable technologies[22], or their partnerships with DOE[23], the DOD has made clear that investment in cleaner, more efficient, more agile technologies is an essential part of their strategic and tactical abilities, as well as the nation's energy security. In addition, Heritage's proposal ignores the growing collaboration occurring between DOD and DOE. If Heritage had it their way, DOD would lose a key partner in the long-term effort for greater force effectiveness and security through better energy management.

While the piece does well to mention energy security – or our reliance on imported oil and economic vulnerability to volatile global oil prices – its recommendations would undermine the very concept.

Heritage seems to believe that domestic fossil fuel production and nuclear technologies alone should be exploited to achieve energy independence. Unfortunately, doing so would do little to rectify the security concerns over foreign oil. According to the Energy Information Administration, expanding oil drilling in the Gulf of Mexico, Atlantic shelf, and Arctic wildlife refuge would only lead to increased oil production optimistically between 2020 and 2030.[24] And it still wouldn't win our independence from foreign oil as it's expected to increase domestic production by no more than 5 million barrels a day, roughly one-quarter of current U.S. oil consumption. And in terms of rising oil prices, these 5 million barrels a day would do almost nothing to lower prices, as oil is traded on the world market.[25] In effect, Heritage's proposal would continue to exacerbate U.S. energy security concerns and punt on addressing the issue entirely.

It's also no secret that the Heritage Foundation doesn't believe in the science of global climate change. Yet a majority of Americans are inclined to trust the evidence and are concerned about climate change.[26] Whether you think climate change poses an apocalyptic threat or a more manageable phenomenon, it is clear we need to adjust to how we produce and consume energy. In a report published last year, ITIF calculated that in order for the world to meet a more conservative goal of 50 percent reduction in greenhouse gas emissions by 2050, given the expected increase in global population and per capita income, the planet's economic activity must become 84 percent less "dirty."[27] In other words, every unit of energy utilized must emit at least 84 percent less GHG emissions. Meeting this goal is daunting on such a relatively short time scale. Without transforming the energy sector away from fossil fuels, this goal can never be met. Accomplishing this kind of energy modernization effort is only possibly through accelerated innovation to make advanced, low-carbon energy technologies affordable and readily scalable, an effort in which DOE must play a pivotal role.

CONCLUSION

As ITIF has said previously, there are two ways to address the budget deficit and national debt:

> There's responsible investment and fiscal management, and then there's throwing the baby out with the bathwater. The trick is to know the difference, and make the kinds of cuts we have to make without also cutting those pieces that are germane to long-term growth, competitiveness, and innovation.[28]

The Heritage proposal is clearly the latter. They simply don't get it. The reasons for it run deep, whether it's rejection of climate change, out-dated neo-classical economic ideology, or the same old conviction that all government support for science and technology amounts to a ham-handed effort at "picking winners." The issues of deficits, debt, and energy require a serious debate. Unfortunately, the numerous inaccuracies and inconsistencies in the Heritage proposal muddy that debate and move us in the wrong direction.

Many of DOE's programs are solid examples of the proper, positive role government can play in partnership with industry. There is little doubt that many of the programs in the

United States energy innovation system can and should be improved, but they won't be improved by being gutted entirely, as Heritage proposes. It is precisely the kind of public-private partnerships, research projects, and investments advanced by many key DOE programs that will allow the United States to make much-needed progress on both its energy and deficit challenges.

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ABOUT ITIF

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.

ABOUT BTI

Breakthrough Institute (BTI) 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.

ABOUT AEL

Americans for Energy Leadership (AEL) 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.