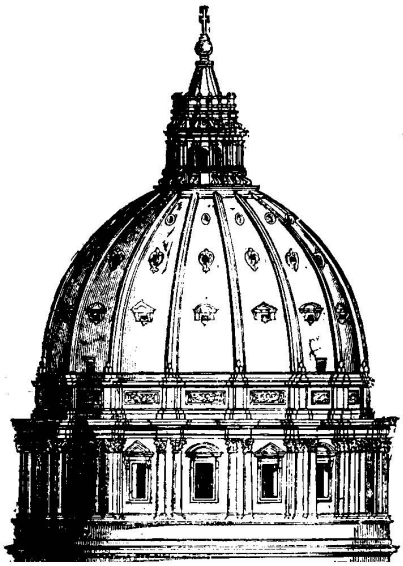
ISSUE BRIEF #01/2010



Joint Strike Fighter Alternate Engine

BY DAVID WILLIAMS
AND SEAN KENNEDY

CITIZENS AGAINST GOVERNMENT WASTE

1301 Pennsylvania Avenue, N.W.
Suite 1075
Washington, D.C. 20004

1.800.Be.Angry

www.cagw.org

INTRODUCTION

Wasteful spending at the Department of Defense (DOD) has a long and notorious history, including the $436 hammer, the $640 toilet seat, and 15 pages of instructions on how to bake chocolate chip cookies. The latest nightmare for taxpayers is the alternate engine for the Joint Strike Fighter (JSF) platform.

In the past eight years, the JSF program has become the largest acquisition program within the DOD, with a total cost estimate of $300 billion. It has also become the lengthiest acquisition program; it is anticipated to last through 2034. The JSF has seen cost overruns of $55 billion, and delivery dates for "initial operational capability" pushed back from 2010-2012 to 2012-2015.

From conceptualization to procurement to use in the field, weapons systems go through many phases of development, including meddling by Congress, that provide ample opportunities for waste, fraud and abuse. The current debate surrounding the alternate engine for the JSF is a classic case of unnecessary and expensive congressional involvement in DOD procurement.

JSF PROGRAM HISTORY

The JSF program was designed to create an affordable alternative to the current fighters in all branches of the military, which are starting to show their age in terms of wear and tear and competitive performance. The military predicts that the JSF, known as the F-35 Lightning II, will be without rival until 2040.

In 1995, there were four participants in the bidding process for the JSF platform: Boeing, Lockheed Martin and Northrop Grumman, all of which elected to incorporate the Pratt & Whitney engine into their designs, and McDonnell Douglas, which chose a model produced by General Electric (GE) and Rolls-Royce.[1] Before the competition for the JSF design began in 1996, however, McDonnell Douglas abandoned its bid and joined with Northrop Grumman. That move effectively created three bidders, all of which employed the Pratt & Whitney engine, which was a variant of the F119 engine and would come to be known as the F135.

According to Air Force General George Muellner, who was then the director and program executive officer for the Joint Advanced Strike Technology Program, the bidders were free to choose whichever engine they wanted. In an interview with *Aerospace America* in September 1995, General Muellner stated, "We are going to have a competitive flyoff, with two design families competing against each other and a downselect by the year 2000. With regard to the engine, we told the contractors that they were free to select any engine that was or could be available. The weapons system contractors have all selected a variant of the F119 engine for the demonstration phase."[2]

Despite this unanimous decision by the contractors, Congress added $7 million to the fiscal year (FY) 1996 budget for the alternate GE/Rolls-Royce (F136) engine. The F136 program received its first funding request ($18 million) from the Pentagon in FY 1997.

In 2001, Lockheed Martin's design, which included the F135 engine, won the contract for the JSF platform. Pratt & Whitney was awarded a 10-year, $4.8 billion contract to produce the engine.

The alternate engine program received support from the executive branch through FY 2006. In FY 2007, the DOD proposed termination of the F136 program, and did not include funds in its budget request. When asked to address the decision by the DOD to forgo funding for the F136, then-Secretary of Defense Donald Rumsfeld on February 16, 2006, replied, "any sole-source risk was modest and acceptable."[3]

The alternate engine program has been the subject of several comprehensive reports indicating that it is duplicative and unnecessary. According to an article by CBSNews.com on July 20, 2007, the Air Force and two independent panels concluded that the second engine is "not necessary and not affordable," and that the alleged savings from creating a mock competition "will never be achieved."[4] A May 21, 2010 story by ABC News called the alternate engine a "$3 Billion Government Boondoggle."[5]

In an effort to convince skeptics in Congress, the Pentagon, and the White House, on April 27, 2010 GE/Rolls-Royce submitted a fixed-price offer for early-production engines purchased in 2012, and a reduced price for engines in 2013 and 2014, in which it claimed to assume all risks for cost overruns. The estimates for these years were not disclosed. However, this proposal is deceptive. One caveat is that according to a Pentagon study, prior to the point where the companies are able to sell engines, GE and Rolls-Royce require $2.9 billion in taxpayer funds over six years for infrastructure and spare parts, and to complete development.[6]

In addition, according to the DOD, the cost in the fixed-price offer is dependent on a fixed configuration.[7] Should the configuration change, the risk is transferred to the government, meaning taxpayers would be on the hook for any cost overruns.

INDEPENDENT ANALYSIS

A report released by the Government Accountability Office (GAO) in March 2007 found that funding the alternate engine could be a prudent use of market forces in government contracts. According to the report, funding the alternate engine could "in the long run, reduce costs and bring other benefits." However, the potential savings highlighted by the GAO came with the following stipulation: "these results are dependent on how the government decides to run the competition, the number of aircraft that are ultimately purchased, and the exact ratio of engines awarded to each contractor."[8]

With the reduction in the number of jets scheduled to be ordered by the U.S. and its allies (the DOD is currently planning to purchase 2,443 F-35s,[9] or 535 fewer than their original

estimate of 2,978 in 1996[10]), significant questions exist regarding the benefits of funding the alternate engine. Dr. Loren Thompson, Chief Operating Officer of the Lexington Institute, put this succinctly in an issue brief on May 27, 2009:

> So the bottom line is that the government can save billions of dollars in the near term by killing the alternate engine, or spend the money and hope that planets align to generate some net savings over the next 30 years. There are other supposed benefits of competition such as greater reliability, but on close examination these prove to be unsupported by logic or experience. To make matters worse, congressional supporters are paying for the extra engine by cutting aircraft from the F-35 program at a key moment in its development.[11]

The Institute for Defense Analyses (IDA) released a report in the fall of 2008 that also questioned the cost savings of the alternate engine. IDA reported that if savings were to come from production of the alternate engine, "these savings would have to be 40 percent of total production costs." The report went on to say that "savings of this magnitude would be unlikely given the 11 percent – 18 percent savings realized in the previous engine competitions examined … ", referring to the competition between Pratt & Whitney and GE for the F-15 and F-16 engines.[12]

A March 2009 GAO report stated that JSF development "will cost more and take longer than reported to the Congress last year, and DOD wants to accelerate procurement believing that will more quickly recapitalize tactical air forces. The program office estimates that an additional $2.4 billion is needed for cost overruns on the air system and engine contracts and for a 1-year extension to the development schedule."[13]

However, as GAO pointed out, this estimate does not include the cost of the alternate engine that is not wanted by the Pentagon but, nevertheless, is being funded by Congress through earmarks. With the cost of funding for the F136 included, GAO reported "an independent joint DOD cost estimating team identified a need for as much as $7.4 billion in additional funding for development through FY 2015 and a 3-year schedule extension. This would increase total system development costs to $51.8 billion -- a 17 percent increase from the April 2008 estimate and delay completion of development to October 2016."[14]

PROS AND CONS

Pros

Proponents of the alternate engine assert that funding the F136 would create several benefits: first, a market for engines would encourage both companies to create a better engine for less money. Also, having more than one company working on F-35 engines would be good for the defense industrial base. Finally, funding the F136 would increase safety and reliability. This argument borrows from the cliché "don't put all your eggs in one basket."

Cons

Unfortunately, rules that apply to marketplace competition often are not relevant within the framework of government spending. The Lexington Institute spelled out this dilemma in *Powering JSF: One Engine is Enough*:

> …the beneficial effects of competition depend upon a free and open market. In economic theory, a situation of "perfect competition" is said to prevail when there are many buyers and sellers of a product, the product is identical from one supplier to the next, sellers have minimal control over pricing, buyers have complete knowledge about the product they are purchasing, and there are no barriers to any party entering or exiting the market. Unfortunately, none of these conditions exist in a market for military goods.[15]

According to a March 22, 2007 GAO report, the DOD eliminated funding for the alternate engine prior to the FY 2007 budget submission, claiming that "no net cost benefits or savings are to be expected from competition," and "low operational risk exists for the warfighter under a sole-source engine supplier strategy."[16] In fact, competition between two rival companies trying to develop two separate engines will cost the government immensely. The government is paying to develop, produce, and supply both engines. To maintain competition between both companies, DOD will need to underwrite two teams of engineers, as well as duplicate sets of tooling, parts, assembly sites, repair facilities, supply chains, management systems, workforces, and every other cost of production.

This duplication should not result from a truly competitive process. In an *Atlanta Journal-Constitution* op-ed on May 3, 2010, Rep. Lynn Westmoreland (R-Ga.) expressed his support for competition, but asserted that it "…doesn't mean buying two of everything. Plus, no military aircraft developed in the last 30 years has used an alternate engine."[17]

Pentagon officials have stated the following regarding the cost of the alternate engine program:

- "We do believe that the full-up costs for us are about $2.9 billion. This department has a long and unhappy experience with overly optimistic contractor estimates. The proposal does provide a fixed price, but not for the engine we need. The proposed engine is based on the design they currently have on the test stand, which we are deeply concerned may not meet the performance needs of the Joint Strike Fighter. Any cost to take the design to required JSF performance levels would presumably be paid by taxpayers. The current engine -- their current engine, the alternate engine proposal, the engine is far less mature than the JSF engine. The proposed engine is still in development, has about 200 hours of testing compared to 13,000 for the F-135."

– Secretary of Defense Robert Gates, press conference at the Pentagon, May 20, 2010[18]

- "Pursuing an extra engine is an unnecessary luxury we simply cannot afford, especially in our current fiscal condition. Any savings that might result from an engine competition are years away, purely hypothetical and likely modest at best."
  –Pentagon Press Secretary Geoff Morrell, email to Reuters as reported on May 19, 2010[19]

- "Study on top of study has shown that an extra fighter engine achieves marginal potential savings but heavy upfront costs -- nearly $3 billion worth."
  –Secretary of Defense Robert Gates, address at the Eisenhower Presidential Library, May 8, 2010[20]

- "One of the members of Congress, I'm told, said, well, why is $3 billion for the alternative engine such a big deal when we've got a trillion-dollar deficit? I would submit that's one of the reasons we have a trillion-dollar deficit, is that kind of thinking. Three billion dollars is a lot of money in the Defense budget, and particularly in these times. And so we're not just going to roll over to preserve programs that we think we don't need, regardless of where the pressure is coming from."
  –Secretary of Defense Robert Gates, speaking with the media en route to Kansas City, Missouri, May 7, 2010[21]

- "There is not a good analytical case that the upfront costs of the second engine would be paid back."
  –Undersecretary of Defense for Acquisition Ashton Carter, address to Sea-Air-Space Symposium, May 4, 2010[22]

- "We feel strongly there is not a need for the second engine. Every dollar additional to the budget that we have to put into the F-35 is a dollar taken from something else that the troops may need."
  –Secretary of Defense Robert Gates, speaking with the media while touring the F-35 assembly plant in Fort Worth, Texas, August 31, 2009[23]

Second, maintaining the alternate engine program will not improve the industrial base, while the competition that Congress is trying to create is likely to do more harm than good. Dr. Loren Thompson wrote in a February 24, 2009 United Press International article that having two engines will drive prices up.[24] The government will have to make sure both companies stay in business every year in order to ensure competition for annual contracts; a hefty bill for taxpayers. Divided funding means GE and Pratt & Whitney will earn less profit each year. The two firms will eventually focus on maximizing their share of the profit instead of attempting to outcompete the competition through quality and affordability. Thompson pointed out, "At that point, the government will have lost

both the competitive dynamic and economies of scale. This sounds more likely to weaken the industrial base than strengthen it."[25]

While GE is certainly fighting for the alternate engine as if its livelihood depends on it, the company is doing well regardless of funding for the F136. As GE Aviation President and CEO Scott Donnelly candidly admitted during a Senate Armed Services Committee hearing on March 15, 2006, "This issue of industrial base is a very good question and I don't think anybody's ever said that GE's going to shut up shop and go home if they're not part of this contract."[26] Sen. Joe Lieberman (I-Conn.) furthered this argument during a Senate Airland Subcommittee hearing on June 9, 2009, stating, "on the record, GE has the largest share of the engine market. Now, I know that can change over time but my own conclusion about the industrial base in this case is that these are three strong companies."[27]

Regardless of the impact on GE, maintaining the industrial base is not an excuse to waste money. Retired Air Force General John Michael Loh wrote in a June 22, 2009, *Fort Worth Star-Telegram* op-ed, "It is poor acquisition policy to guarantee production to a manufacturer just to maintain an industrial base," and "Industrial base considerations also are overblown. General Electric, the alternate engine contractor and the largest U.S. producer of military engines, has substantial military and commercial engine programs for 15 years and beyond."[28]

The third argument is that the alternate engine will make the JSF program safer and easier to maintain. Questions of safety can be put to rest based on the testimony of many leading experts in the field. High-ranking military officials and expert defense analysts have championed the F135 as a reliable and safe single-source engine, including the following:

- "There is no need for a hedge against failure of the primary engine because most military planes are developed with only one engine supplier and fleets are almost never grounded due to engine problems (for instance, GE built all the engines for the Navy's Hornets and Super Hornets). Third, the GE engine is a more likely candidate for failure than the Pratt engine, since it has had multiple testing failures leading to a redesign whereas the Pratt engine is performing very well."
  –Dr. Loren Thompson, "Bottom Line on Alternate Engine: A Waste of Money," States News Service, March 8, 2010[29]

- "The current engine in the F-35 is in production and exceeding expectations. It has a strong pedigree as a variant of the F-22 engine. That engine, the Pratt & Whitney F119, has been one of the most successful engine development and production programs in history. It is three times safer and more reliable than its predecessor, the F100 engine. There is no reason to expect a catastrophic failure that would necessitate an alternate engine."
  – Retired Air Force General John Michael Loh, *Fort Worth Star-Telegram*, June 22, 2009[30]

- "Our belief is the risks associated with a single source engine supplier are manageable due to improvements in engine technology and do not outweigh the investment required to fund a competitive alternate engine."
  – Statement of Daniel J. Darnell, Deputy Chief of Staff, U.S. Air Force, to the House Air and Land Forces Subcommittee, May 20, 2009[31]

- "We feel very comfortable with the F119 core engine, that is the F135. I think it has in excess of 50,000 flight hours, high reliability and performing very well."
  – Statement of William Balderson, Deputy Assistant Secretary of Defense, to the Senate Airland Subcommittee, April 26, 2007[32]

The money used to pay for the alternate engine is being taken from F-35 production. The House cut two F-35 jets from its version of the FY 2010 defense appropriations bill in order to fund the F136 and the sacrifices do not stop there.[33] By the time the alternate engine is completed, it will have cost $7.2 billion,[34] enough money to buy 53 F-35 jets.[35]

Sen. Lieberman articulated this point in a statement on the Senate floor on July 23, 2009: "Not only do we not need it, the Air Force testified before our committee that if we spend this money on a second engine, we are going to get, by General Shackelford's testimony to us, 53 fewer Joint Strike Fighters in the next 5 years. We will not be able to afford them. That is a serious consequence."[36]

The cost of irresponsible spending was clearly stated by Chief of Naval Operations Admiral Gary Roughead, who put himself "solidly in the one-engine camp" simply because aircraft carriers cannot afford to carry two sets of engine parts.[37] "Space is at a premium," he noted in *CQ Politics* on June 30, 2009, alluding to the fact that even if the F136 was completed and proven to be reliable, it would take up valuable space on the carriers.[38]

The alternate engine has faced its share of problems in the past year. In October, 2009, a nut came loose during testing of the F136, causing damage to turbine blades. Then, in November, 2009, GE/Rolls-Royce announced that deliveries of the alternate engine would be delayed by one year.

Finally, the DOD has warned that a reduction in orders for the JSF in FY 2011 would result in an overall increase in cost and risks.[39] The DOD also asserted that U.S. relations with international partners involved in the JSF program would be negatively affected by a reduction in orders, as other countries might be forced to delay or opt out of purchasing agreements because of increased costs.[40]

LEGISLATIVE ACTION

Funding for the alternate engine has been a political hot potato since its inception. Recently, members of Congress and the administration have lined up on either side of the

issue. Some members of Congress have asserted their opposition to the alternate engine. Sen. John McCain (R-Ariz.) stated on July, 23, 2009, "I hope the great engine war is over. I know of no data or analysis that supports that taxpayers will see any net savings from subjecting the engine for the JSF to any further competition."[41]

Another critic of the alternate engine, Sen. Lieberman, has urged his congressional colleagues to "stop wasting taxpayer dollars on this project and to instead invest in those programs that do keep us safe."[42] Sen. Lieberman also noted the unnecessary redundancy of the alternate engine: "Developing a second engine, quite logically and following common sense, would require the Department of Defense to maintain two logistics operations to support it--tails, as it is called in the military, two tails, two sets of training manuals, two sets of tooling component improvement parts. These additional and unnecessary expenses would raise operations and sustainment costs for the Joint Strike Fighter throughout the life cycle of the program."[43]

Regardless of opposing arguments, expert testimonies, threats of a presidential veto, and the Pentagon's repeated refusal to request funding for the F136 in its budget, Congress has found ways to subsidize this wasteful project. The alternate engine received $1.2 billion in earmarks from FY 2004 through FY 2010, including $465 million added anonymously in FY 2009 and FY 2010.[44]

On July 23, 2009, the Senate voted 59-38 to eliminate funding for the alternate engine from its version of the National Defense Authorization Act for FY 2010. The House, however, included an anonymous earmark worth $603 million for the alternate engine in its version of the bill. The House also included an anonymous earmark worth $560 million for the alternate engine in its version of the 2010 Department of Defense Appropriations Act; here again, the Senate did not fund the F136. The final version of the Defense Authorization bill contained $560 million for the alternate engine, while the Defense Appropriations bill contained $465 million.

On May 7, 2009, President Obama highlighted the alternate engine as an example of government waste. The President stated, "…we're going to save money by eliminating unnecessary defense programs that do nothing to keep us safe, but rather prevent us from spending money on what does keep us safe. One example is a $465 million program to build an alternate engine for the Joint Strike Fighter. The Defense Department is already pleased with the engine it has. The engine it has works. The Pentagon does not want and does not plan to use the alternative version. That's why the Pentagon stopped requesting this funding two years ago. Yet it's still being funded."[45] In June, 2009 President Obama declared his intent to veto any legislation that contains funding for the alternate engine.[46]

The biggest key to understanding why some members of Congress are so adamant about funding the alternate engine program is a letter written on April 23, 2009, to President Obama by Rep. Steve Driehaus (D-Ohio) and cosigned by 24 members of the House. All but four of the signatories come from the states of Indiana and Ohio.[47] This is not a coincidence, given that GE plants are designing, building, and testing the F136 largely in

these states. This is a prime example of pork-barrel legislation – sending federal dollars back home to win votes.

The motives of the four non-Ohio and Indiana representatives can be similarly explained. Reps. Steven Rothman (D-N.J.) and Joe Wilson (R-S.C.) cannot be called out on pandering to constituents, but both have received thousands of dollars from the PACs of General Electric[48] and Rolls-Royce,[49] while Rep. Geoff Davis (R-Ky.) has received money from the General Electric PAC, and Rep. Bobby Scott (D-Va.) has received donations from the Rolls-Royce PAC. Although Rep. Neil Abercrombie (D-Hawaii) did not attach his name to this letter, he also supports the alternate engine program and has received money from the Rolls-Royce PAC.[50]

The fight over funding for the alternate engine recently began anew. On May 14, 2010, the House Air and Land Forces and Seapower Armed Services subcommittees approved $485 million for the F136. As it currently stands, H.R. 5136, the National Defense Authorization Act for FY 2011 contains funding for this amount. However, an amendment to strip funding for the alternate engine is expected to be offered.

In a press conference on May 20, 2010, Defense Secretary Gates stated that if a bill containing funding for the alternate engine should reach President Obama's desk: "I will strongly recommend that the president veto such legislation."[51] Gates also said, "Let me be clear. I believe the defense budget process should no longer be characterized by business as usual within this building or outside of it."[52] A May 24 *Washington Post* story noted that, "White House officials told House Democratic leadership aides that the threat from Gates was serious and urged them to omit the project from the bill."[53]

CONCLUSION

Funding the alternate engine has become a prime example of members of Congress placing their own priorities above the nation's security and an efficiently-run government. The alternate engine program is a waste of time, energy, and money, which could be used to strengthen the military. Until funding is cut from Congress' pork-fueled alternate engine, the program will continue to be a burden on taxpayers and the military.

President Obama,[54] top military officials, former President George W. Bush,[55] the Office of Management and Budget,[56] and independent analysts[57] all agree that this project should be eliminated. Congress' insistence on financing the project through unwanted earmarks comes more from self-interest than concern over national security.

The United States faces many enemies at home and abroad. Funding unwanted defense projects undermines the nation's ability to defend both fiscal and physical interests. The decision to fund or eliminate the alternate engine is a key test of Congress's willingness to cut wasteful spending.

REFERENCES

[1] http://armed-services.senate.gov/statemnt/2006/March/Donnelly-Guyette%2003-15-06.pdf.
[2] http://www.f135engine.com/alternate-engine/thirdparty-comments.shtml.
[3] Scully, Megan. "Rumsfeld defends budget decisions on weapons systems." *Government Executive*. February 16, 2006. http://www.govexec.com/dailyfed/0206/021606cdpm1.htm.
[4] Singer, Michelle. "The Engine No One Wants — Except Congress." CBS News. July 30, 2007. http://www.cbsnews.com/stories/2007/07/30/eveningnews/main3115304.shtml.
[5] Mosk, Matthew; Ross, Brian. "A $3 Billion Government Boondoggle?" ABC News. May 21, 2010. http://abcnews.go.com/Blotter/joint-strike-fighter-billion-boondoggle/story?id=10692337.
[6] Tiron, Roxana. "GE, Rolls-Royce woo Pentagon over F-35." *The Hill.* April 4, 2010. http://thehill.com/business-a-lobbying/94595-ge-rolls-royce-woo-pentagon-over-f-35-contract.
[7] The Department of Defense. "Joint Strike Fighter Information, Myths vs. Facts." http://www.cagw.org/assets/jsf-images/jsf-info-paper-myth-fact-final.pdf.
[8] Sullivan, Michael. "Analysis of Costs for the Joint Strike Fighter Engine Program." Government Accountability Office. May 8, 2007. http://www.gao.gov/new.items/d07656t.pdf.
[9] Gates, Dominic. "Boeing would be hit hard by defense budget cuts." *The Seattle Times.* April 6, 2009. http://seattletimes.nwsource.com/html/businesstechnology/2008994809_webdefensecuts06.html.
[10] Bolkcom, Christopher. "Joint Strike Fighter (JSF) Program: Background, Status, and Issues." Congressional Research Service, Library of Congress. January 11, 2002. https://www.policyarchive.org/bitstream/handle/10207/1044/RL30563_20020111.pdf.
[11] Thompson, Loren B. "Obama Is Right: The F-35 Doesn't Need Another Engine." The Lexington Institute. May 27, 2009. http://www.lexingtoninstitute.org/obama-is-right-the-f-35-doesnt-need-another-engine?a=1&c=1129.
[12] Woolsey, Jim. "Evaluating the Costs and Benefits of Competition for Joint Strike Fighter Engines." Institute for Defense Analyses. Fall 2008. http://www.ida.org/upload/research%20notes/rn_fall2008_jsf.pdf.
[13] "Accelerating Procurement before Completing Development Increases the Government's Financial Risk." Government Accountability Office. March 2009. http://www.gao.gov/new.items/d09303.pdf.
[14] Ibid.
[15] Thompson, Loren B. "Powering JSF: One Engine is Enough." The Lexington Institute. January 2008. http://www.lexingtoninstitute.org/library/resources/documents/Defense/powering-jsf.pdf.
[16] Sullivan, Michael. "Analysis of Costs for the Joint Strike Fighter Engine Program." Government Accountability Office. March 22, 2007. http://www.gao.gov/new.items/d07656t.pdf.
[17] Westmoreland, Lynn. "Costly earmark undercuts fighter." *Atlanta Journal-Constitution.* May 3, 2010. http://www.ajc.com/opinion/costly-earmark-undercuts-fighter-516156.html.
[18] "DOD News Briefing with Secretary Gates and Adm. Mullen from the Pentagon." U.S. Department of Defense, Office of the Assistant Secretary of Defense (Public Affairs). May 20, 2010. http://www.defense.gov/transcripts/transcript.aspx?transcriptid=4625.
[19] Wolf, Jim. "US House panel defies Pentagon on fighter engine." Reuters. May 19, 2010. http://www.reuters.com/article/idUSN1923962320100519?type=marketsNews.
[20] Scully, Megan; Kreisher, Otto. "Defiant panels approve $485 million for F-35 alternate engine." *Congressdaily.* May 14, 2010. http://www.govexec.com/story_page.cfm?articleid=45275&oref=todaysnews.
[21] "Media Availability with Secretary Gates en route to Kansas City, Missouri." U.S. Department of Defense, Office of the Assistant Secretary of Defense (Public Affairs). May 7, 2010. http://www.defense.gov/transcripts/transcript.aspx?transcriptid=4621.
[22] Cavas, Christopher P. "DoD official: No case for 2nd JSF engine." *Marine Corps Times.* May 4, 2010. http://www.marinecorpstimes.com/news/2010/05/defense_carter_jsf_050410/.
[23] "Gates Explains Opposition to Alternate F-35 Engine." September 4, 2009. http://www.defencetalk.com/gates-explains-opposition-to-alternate-f-35-engine-21580/.
[24] Thompson, Loren B. "Buying two engines for the F-35 wastes billions of dollars." February 24, 2009. http://www.upi.com/Security_Industry/2009/02/24/Buying-two-engines-for-the-F-35-wastes-billions-of-dollars/UPI-58191235486777/.
[25] Ibid.

[26] http://www.f135engine.com/on-the-record/congress-testimony.shtml.
[27] Ibid.
[28] Loh, John Michael. "Loh: Funding alternative engines for F-35 Joint Strike Fighter a waste of federal dollars." *Fort Worth Star-Telegram.* June 22, 2009. http://www.star-telegram.com/opinion/story/1447600.html.
[29] Thompson, Loren B. "Bottom Line On The Alternate Engine: A Waste of Money." March 8, 2010. http://www.lexingtoninstitute.org/bottom-line-on-the-alternate-engine-a-waste-of-money?a=1&c=1129.
[30] Ibid.
[31] http://www.f135engine.com/on-the-record/congress-testimony.shtml.
[32] Ibid.
[33] Palmer, Eric. "House Proposes F-35 cut, F-35 Alternate Engine, Super Hornet Multi-Year." June 14, 2009. http://ericpalmer.wordpress.com/2009/06/14/house-f-35-cut-f-35-alternate-engine-super-hornet-multi-year.
[34] "Progress Made and Challenges Remain." Government Accountability Office. March 2007. http://www.gao.gov/new.items/d07360.pdf.
[35] Eaglen, Mackenzie. "Why Congress Cares About Engine Competition for the Joint Strike Fighter." The Heritage Foundation. August 24, 2009. http://www.heritage.org/research/nationalsecurity/wm2594.cfm.
[36] Lieberman, Joseph. C-SPAN Digital Archive. July 23, 2009. http://www.c-spanvideo.org/videoLibrary/clip.php?appid=595144738.
[37] Donnelly, John M. "Top Navy Officer Opposes F-35 Alternative Engine." *CQ Politics.* June 30, 2009. http://www.cqpolitics.com/wmspage.cfm?docID=news-000003156964.
[38] Ibid.
[39] The Department of Defense. "Joint Strike Fighter Information, Myths vs. Facts."
[40] Ibid.
[41] http://www.f135engine.com/on-the-record/congress-testimony.shtml.
[42] Dimascio, Jen. "Obama veto threat has firm in crosshairs." *Politico.* June 30, 2009. http://www.politico.com/news/stories/0609/24334_Page2.html.
[43] http://www.f135engine.com/on-the-record/congress-testimony.shtml.
[44] Citizens Against Government Waste. *2010 Congressional Pig Book Summary,* p. 16. http://www.cagw.org/reports/pig-book/2010/#III_Defense.
[45] http://www.whitehouse.gov/the_press_office/Remarks-by-the-President-on-Reducing-Spending-in-the-Budget/.
[46] "White House Threatens to Veto Defense Bill." ABCNews.com. June 26, 2009. http://blogs.abcnews.com/politicalpunch/2009/06/white-house-threatens-to-veto-defense-bill.html.
[47] http://driehaus.house.gov/index.php?option=com_content&task=view&id=121&Itemid=77.
[48] http://www.opensecrets.org/pacs/pacgot.php?cmte=C00024869&cycle=2010.
[49] http://www.opensecrets.org/pacs/pacgot.php?cycle=2008&cmte=C00296822.
[50] "Abercrombie: 1 jet engine good, 2 better." United Press International. September 16, 2009. http://www.upi.com/Top_News/2009/09/16/Abercrombie-1-jet-engine-good-2-better/UPI-26461253144026/.
[51] "Gates renews veto threat over F-35 engine." AFP. May 20, 2010. http://www.google.com/hostednews/afp/article/ALeqM5itQjYZjeDwNwVtqv5SMhbcqVKrQQ.
[52] Ibid.
[53] Montgomery, Lori; Murray, Shailagh. "In Congress, spending measures meet bipartisan resistance." *The Washington Post*. May 24, 2010. http://www.washingtonpost.com/wp-dyn/content/article/2010/05/23/AR2010052303486.html.
[54] http://www.whitehouse.gov/omb/assets/sap_111/saphr2647h_20090624.pdf.
[55] http://www.defenselink.mil/news/Feb2005/d20050207budget.pdf.
[56] http://www.whitehouse.gov/omb/budget/fy2010/assets/trs.pdf.
[57] http://www.f135engine.com/alternate-engine/thirdparty-comments.shtml.