Order Code RL34398

CRS Report for Congress

Air Force Air Refueling: The KC-X Aircraft Acquisition Program

February 28, 2008

William Knight and Christopher Bolkcom
Foreign Affairs, Defense, and Trade Division

Prepared for Members and
Committees of Congress

Air Force Air Refueling: The KC-X Aircraft Acquisition Program

Summary

The KC-X program, the first of three planned programs intended to recapitalize the Air Force's air refueling fleet, is expected to acquire 179 new, commercial off-the-shelf airliners modified to accomplish air refueling missions. Both Boeing and a consortium consisting of Northrop Grumman and European Aerospace Defense Company (EADS) — the parent company of Airbus — are in competition for KC-X. Boeing offered a variant of the 767-200 while Northrop Grumman/EADS submitted a version of the Airbus 330-200. The Air Force is expected to announce source selection soon.

Air Force in-flight aerial refueling aircraft, often referred to as "tankers," provide both persistence and range to Department of Defense (DOD) fighters, bombers, airlift and surveillance aircraft. As such, the Air Force's tanker fleet greatly multiplies the effectiveness of DOD air power across the continuum of military operations. Today, the KC-135, which makes up the preponderance of the Air Force's tanker force, is among the Air Force's oldest aircraft. As a result, potential issues for Congress include:

- How long will the KC-135 remain viable as a military air refueler?
- What is the lowest cost alternative for KC-135 recapitalization?
- How many new tankers does the Air Force require?
- What capabilities should KC-X have?
- How will KC-X fit with future tanker requirements?
- Was the competition fair?
- Should a competitive dual-sourcing acquisition model be pursued?
- Where does the Air Force plan to base KC-X aircraft?
- What other options that can be pursued along with KC-X to expedite KC-135 recapitalization and should they be pursued?

This paper will be updated as conditions warrant.

Contents

List of Figures

List of Tables

Air Force Air Refueling: The KC-X Aircraft Acquisition Program

Introduction

The KC-X program, the first of three planned programs intended to recapitalize the Air Force's air refueling fleet, is expected to acquire 179 new, commercial off-the-shelf airliners modified to accomplish air refueling missions. Both Boeing and a consortium consisting of Northrop Grumman and European Aerospace Defense Company (EADS) — the parent company of Airbus — are in competition for KC-X. Boeing offered a variant of the 767-200 while Northrop Grumman/EADS submitted a version of the Airbus 330-200. The Air Force is expected to announce source selection soon.

Air Force in-flight air refueling aircraft, or "tankers," enable Department of Defense (DOD) fighters, bombers, airlift and surveillance aircraft fly farther and stay aloft longer. As such, the Air Force's tanker fleet greatly multiplies the effectiveness of DOD air power across the full continuum of military operations. Today, the KC-135, which makes up the preponderance of the Air Force's tanker force, is among the Air Force's oldest aircraft. As a result, potential issues for Congress include:

- How long will the KC-135 remain viable as a military air refueler?
- What is the lowest cost alternative for KC-135 recapitalization?
- How many new tankers does the Air Force require?
- What capabilities should KC-X have?
- How will KC-X fit with future tanker requirements?
- Was the competition fair?
- Should a competitive dual-sourcing acquisition model be pursued?
- Where does the Air Force plan to base KC-X aircraft?
- What other options that can be pursued along with KC-X to expedite KC-135 recapitalization and should they be pursued?

Background

The KC-X program — currently the Air Force's top acquisition priority — is the first of three planned programs intended to recapitalize the Air Force's air refueling fleet.[1] As part of the KC-X program, the Air Force is expected to acquire 179 new, commercial off-the-shelf airliners modified to accomplish air refueling

---

[1] Major General (USAF) Larry Spencer, "FY09 President's Budget: 'America's Edge: Global Vigilance, Reach and Power," FY2009 Budget Rollout Brief, February 4, 2008, Slide 8, online at [http://www.saffm.hq.af.mil/shared/media/document/AFD-080204-089.pdf].

missions. The Air Force plans to designate the new aircraft as the KC-45A.[2] Future programs known as KC-Y and KC-Z — each anticipated to replace approximately one-third of the Air Force's tanker force — are expected to continue the recapitalization effort over the next several decades.

To provide the context of why the Air Force is pursuing the KC-X program today, this section of the report analyzes the role of air refueling aircraft in joint operations, outlines the DOD's current air refueling capabilities, and explains key air refueling operational constructs from which tanker requirements are derived. In addition, a summary of KC-135 funding is provided in **Appendix A** while review of former issues for Congress is provided in **Appendix B**.

Air Refueling in Joint Operations

Air refueling has played a significant role in our nation's national security beginning in the Cold War and continuing into current military operations. They also extend the range of fighters, bombers, and other aircraft. Tankers increase the range and flexibility of forces and extend the amount of time combat and surveillance aircraft can stay "on-station." According to Air Force leaders, "Clearly the tanker fleet is really some of the very fiber that holds our Air Force's unique global capabilities together. It is an essential enabler for getting to the fight and fighting the fight."[3] In practice, U.S. military aircraft have projected power over long distances and into theaters, but with less than desirable access to forward bases or neighboring airspace. Thus, combat and combat support aircraft must often fly great distances to reach each area of operation, maneuver within theater, and then return to their operating bases after mission completion. Each of these factors increases air refueling demands. Without air refueling, receiver aircraft would likely be less effective, or unable to complete their assigned missions, and American military power would be potentially hamstrung.

Cold War. The Air Force initially began to purchase the KC-135 fleet in the mid-1950s to refuel newly acquired B-52 nuclear bombers operated by Strategic Air Command.[4] Additionally, air refueling played a significant conventional role in the Vietnam War during the 1960s and 1970s by flying 194,687 sorties (an average of more than 21,000 sorties each year) that refueled 813,378 aircraft with almost 9 billion pounds of jet fuel.[5] A brief review of recent conflicts indicates the importance of tanker aircraft.

1991 Persian Gulf. During the 1991 Gulf War, tankers contributed to two objectives: "the speedy deployment of large air forces into the region, and the use of

---

[2] "Now All We Need is the Aircraft," *Air Force Association Daily Report*, January 24, 2008, online at [http://dailyreport.afa.org/AFA/Reports/2008/Month01/Day24/1030aircraft.htm].

[3] A. Butler, "Air Force Mulling Replacement for Aging, Maintenance-Needy KC-135," *Inside the Air Force*, May 4, 2001.

[4] Richard K. Smith, *75 Years of Inflight Refueling: Highlights 1923-1998*, Air Force History and Museum Program, 1998, pp. 44-45.

[5] Ibid, p. 60.

these forces in large and complex air combat operations."[6] First, nearly 100 tankers formed "air bridges" across the Atlantic and Pacific Oceans that allowed fully loaded fighters and bombers to deploy nonstop from U.S. bases directly into the Persian Gulf region. During combat operations, tankers allowed air defense and command and control aircraft to remain aloft for extended periods of time while extending the range of most attack missions.[7] In so doing, 306 tankers flew 16,865 missions while delivering over 800 million pounds of fuel to 51,696 receiver aircraft.[8]

Recent Operations. In 1999, 175 air refueling aircraft participated in NATO combat operations in Kosovo by flying 5,215 sorties while transferring more than 253 million pounds of fuel to 23,095 coalition receivers.[9] Between September 11, 2001 and the end of 2007, tankers flew 10,400 missions enabling homeland defense air patrols as part of Operation Noble Eagle.[10] Combat operations in Afghanistan during 2001 and 2002 required 80 tankers that executed 15,468 sorties while offloading 1.166 billion pounds of fuel to 50,585 aircraft.[11] Operation Iraqi Freedom also required a significant tanker contribution, requiring a peak of 305 tankers in March of 2003.[12] In 2003, 185 tankers flew 6,193 sorties refueling 28,899 receivers with 376 million pound of fuel.[13] **Table 1** summarizes tanker contributions to ongoing operations in both Afghanistan and Iraq from 2004 to 2007.

Table 1: Tanker Operations in Iraq and Afghanistan, 2004-2007

	2004	2005	2006	2007
Sorties	12,465	12,391	12,787	15,875
Fuel Offloaded (lbs.)	740 million	778 million	871 million	946 million
Receivers Refueled	N/A	N/A	42,083	79,798

Source: U.S. Central Air Forces/Combined Air Operations Center Public Affairs Office

---

[6] Thomas A Keaney and Elliot A. Cohen, *Gulf War Air Power Survey Summary Report*, Washington, D.C., 1993, p. 190.

[7] Ibid.

[8] GAO-04-349, *Military Aircraft: DOD Needs to Determine Its Aerial Refueling Requirements*, June 2004, p. 10.

[9] Ibid.

[10] "Noble Eagle Sorties Continue," Air Force Association Daily Report, January 4, 2008, online at [http://dailyreport.afa.org/AFA/datapoints/2008/].

[11] GAO-04-349, p. 10.

[12] *Defense Science Board Task Force Report on Aerial Refueling Requirements*, May 2004, pp. 27-28.

[13] GAO-04-349, p. 10.

DOD Air Refueling Capabilities

Air Force KC-135 Stratotankers and KC-10 Extenders form the preponderance of DOD's air refueling capability and the KC-X program is designed to recapitalize this portion of DOD air refueling capability. Both Stratotankers and Extenders can also carry passengers and cargo. However, airlift capability comes at the expense of a corresponding decrease in the amount of fuel they can carry. Further, the Air Force, Navy and Marine Corps also maintain small refueling fleets tailored to meet service-specific requirements.

KC-135 Stratotanker. KC-135s first entered service between 1957 and 1965, as Boeing delivered 732 KC-135A Stratotankers to the Air Force. In the 1980s, KC-135As were upgraded to KC-135Es with four Pratt & Whitney TF-33 engines — capable of producing approximately 18,000 pounds of thrust. E-model engines were obtained from surplus commercial Boeing 707 airliners. Beginning in 1982, other KC-135As were upgraded to KC-135Rs following modification with four CFM-56/F108 turbofans — each capable of generating approximately 22,000 pounds of thrust. Today, the KC-135 fleet averages approximately 46-years of age. Twenty KC-135Rs have been modified with Multi-Point Refueling System wingtip pods so they can simultaneously refuel two probe-equipped aircraft.[14] Another eight KC-135Rs have been modified to receive fuel in-flight. On-going modifications are giving KC-135s advanced avionics that improve reliability and meet increasingly stringent global air traffic management requirements.[15] KC-135 aircraft specifications are listed in **Appendix C**. **Table 2** summarizes selected operational characteristics of the Air Force's KC-10 and KC-135 air refueling aircraft.

Table 2: KC-135 and KC-10 Operational Capabilities

	Inventory	Fuel Capacity	Passengers	Cargo*
KC-10A	59	356,000 lbs.	75	170,000 lbs
KC-135E	85	180,000 lbs.	54	83,000 lbs
KC-135R	418	200,000 lbs.	54	83,000 lbs

Sources: The Air Force Handbook 2007, pp. 172-175; current KC-135E inventory verified through e-mail with SAF/LL, January 28, 2008.

* Cargo payloads are in lieu of carrying fuel.

KC-10 Extender. The KC-10 combines air refueling and long-range cargo capabilities into a single aircraft. The KC-10 is more flexible and more capable than

---

[14] Probe and drogue air refueling is accomplished by a probe-equipped receiver flying the receiver aircraft's probe into the tanker's drogue — a basket attached to the end of a flexible hose or the tankers boom. Once connected, the tanker transfers fuel to the receiver aircraft.

[15] Susan H. H. Young, "Gallery of USAF Weapons," *Air Force Magazine*, May 2007, p. 145.

the KC-135 as it can carry much more fuel and can be refueled in the air to increase delivery range or on-station time. All KC-10s use an advanced flying boom[16] that can refuel either boom or probe and drogue receivers on the same flight.[17] Additionally, 20 KC-10s have been equipped with wingtip probe and drogue systems similar to ones installed on the KC-135.[18] The KC-10 currently averages approximately 23 years of age.[19] KC-10 aircraft specifications are listed in **Appendix D**.

Service Organic Air Refueling. The Air Force, Marine Corps, and Navy maintain some air refueling capability to facilitate certain organic capabilities. The Air Force operates modified C-130s to refuel Air Force special operations and combat search and rescue helicopters while the Marine Corps uses modified C-130s to refuel Marine helicopters and fighters. Further, some Navy aircraft have been configured to refuel other Navy or Marine Corps aircraft in-flight as a secondary mission. These aircraft give carrier battle groups organic refueling capability when operating independently. However, carrier-based naval aircraft are capable of providing relatively small fuel off-loads in comparison to Air Force tankers. Thus, the Navy primarily relies on the use of Air Force tankers for long-range flight operations.[20]

Air Refueling Operational Concepts

Air refueling aircraft operate in a support role enabling combat operations in support of joint force commander objectives. There are three primary factors that drive operational requirements during joint operations: boom vs. probe and drogue receivers; tanker fuel capacity vs. the number of areas (air refueling tracks) tankers are required to support; and the number of time periods tankers must support. Finally, tankers capable of being refueled in flight can also add to the flexibility of air operations.

Boom vs. Probe and Drogue Air Refueling. Receiver aircraft can be equipped to refuel from a boom (most Air Force aircraft) or with a probe and drogue (most Navy, Marine Corps, and allied aircraft). Operational planners must ensure tasked tankers are equipped to connect with their scheduled receiver.[21] **Figure 1** contains an example of "boom" air refueling.

---

[16] Boom in-flight air refueling is accomplished by an Air Force Airman known as the Boom Operator, flying the tanker's refueling boom into the receiver's receptacle. Once connected, the tanker pumps fuel from its fuel tanks into the receiver's fuel tanks.

[17] Ibid.

[18] *The Air Force Handbook 2007*, pp. 172-175.

[19] "Age of the Active Duty Fleet," *Air Force Magazine*, May 2007, p. 63.

[20] Department of the Navy (N78) provided to CRS by email September 2, 2005.

[21] *Air Force Doctrine Document 2-6, Air Mobility Operations*, March 1, 2006, pp. 51-52.

Figure 1. Photo of "Boom" Air Refueling

Source: USAF Photo by A1C Lonnie Mast.

Both the KC-10 and KC-135, can accomplish both "Boom" and "Drogue" refueling. However, while KC-10s can refuel either receiver type on the same mission, most KC-135s must be converted from "Boom" refueling to "Drogue" or vice versa on the ground. This limitation reduces the KC-135s effectiveness in comparison to the KC-10 and potentially in comparison to the KC-X which is expected to be equipped to refuel both receiver types on the same mission. **Figure 2** contains an example of hose and drogue refueling.

Figure 2. Photo of "Hose and Drogue" Air Refueling

Source: USAF photo by TSgt Erik Gudmundson.

Capacity vs. "Booms in the Air". Receiver requirements establish the timing, location and fuel off-load amounts for operational missions. Therefore sometimes the number of tankers required to execute an operational scenario is driven by the tanker's offload capacity while other times requirements are based on maintaining sufficient tankers aloft to match the timing and location of receiver needs. Planners strive to accomplish air refueling missions as efficiently as possible while optimizing the effectiveness of the receiver's mission. Therefore, planners must ensure scheduled tankers have sufficient capacity and are scheduled in sufficient numbers to ensure the overall effects desired by joint force commanders.[22]

Capacity. Air refueling capacity refers to the amount of fuel available to accommodate a receiver aircraft's fuel on-load requirements. For example, a tanker mission planned to refuel fighter aircraft during a trans-oceanic crossing will be constrained primarily by the tanker's fuel capacity. In this case, the long journey will provide receiver aircraft more than ample time to take on required fuel. However, the tanker will use a significant amount of its own fuel capacity due to the long-range nature of the mission. Likewise, tanker capacity may be the principal consideration when planning refueling missions for heavy aircraft, such as bombers, mobility aircraft, and command and control aircraft, due to their higher fuel requirements.

"Booms in the Air". "Booms in the air" refers to the number of tankers capable of refueling receiver aircraft. A mission supporting multiple mutually supporting aircraft that are all required to initiate operations from the same location and at the same time to achieve a desired combat effect will potentially require multiple tankers to ensure there are sufficient "booms in the air" to achieve overall mission timing requirements. Likewise, operations that are widely dispersed over time or space often require multiple tankers to ensure sufficient "booms in the air" in order to achieve a joint force commander's objectives. For example, consider a potential homeland defense scenario requiring fighters to fly combat air patrols off both the Atlantic and Pacific coasts simultaneously. This example illustrates how multiple tankers are often necessary due to both mission timing and distance between refueling tracks even though a single tanker would likely have the capacity to support each receiver if time and distance were not limiting.

Tanker's Receiver Capability. A tanker that is capable of both giving and receiving fuel in flight may also bolster flexibility for air operations.

Theater Operations. Because of the inherently dynamic nature of military operations, receiver assignments are often changed during mission execution. By having non-receiver tankers consolidate excess fuel available for offload into receiver-capable tankers, planners can potentially maintain offload capacity to meet unforeseen contingencies both more efficiently — fewer tankers reduces operating costs; and more effectively — excess aircraft and crews to return to their forward operating bases sooner, thus, accelerating reconstitution for future operations.

Deployment Support. A second example that illustrates how receiver-capable tankers add mission flexibility and effectiveness is deployment support.

---

[22] Ibid.

Deployment support is a mission where tankers escort receiver aircraft over long distances to expedite deployment timing by minimizing the need for intermediate refueling stops. By in-flight refueling of receiver-capable tankers during deployment support missions, the distance a tanker can bring its receivers is extended. In addition to extending the range of receiver aircraft by refueling, deployment support missions often involve the transportation of cargo and passengers that are part of the receiver aircraft's unit. Thus, receiver refueling capability may also facilitate aircraft deployments by keeping receiver aircraft and their accompanying support personnel and equipment together throughout the deployment process. Thus, a receiver-capable tanker with airlift capacity can minimize the time a flying units take to achieve operational capability at their destination.[23]

Current Capabilities. The Air Force's entire KC-10 fleet and eight KC-135s are capable of receiving fuel in-flight. Additionally, KC-X is expected to be capable of refueling in-flight potentially providing a more flexible tanker to the Air Force.

Issues for Congress

The KC-X program is anticipated to begin recapitalizing the Air Force's Eisenhower-era KC-135 fleet, which makes up the preponderance of the Air Force's tanker force. Potential issues for Congress surrounding the KC-X program include:

- How long will the KC-135 remain viable as a military air refueler?
- What is the lowest cost alternative for KC-135 recapitalization?
- How many new tankers does the Air Force require?
- What capabilities should KC-X have?
- How will KC-X fit with future tanker requirements?
- Was the competition fair?
- Should a competitive dual-sourcing acquisition model be pursued?
- Where does the Air Force plan to base KC-X aircraft?
- What other options that can be pursued along with KC-X to expedite KC-135 recapitalization and should they be pursued?

How Long Can KC-135s Fly?

During the controversy that surrounded the Air Force's earlier tanker lease proposal, a Defense Science Board (DSB) task force was formed to study the urgency of recapitalizing the KC-135 fleet. As part of the study, DSB examined the potential longevity of the KC-135 fleet. The 2006 Rand Analysis of Alternatives (AOA) also looked at the technical condition of the KC-135 fleet. The DSB stated that airframe service life, corrosion, and maintenance costs factors would potentially determine the KC-135s operational life expectancy.[24]

---

[23] Ibid, pp. 45, 48.

[24] *Defense Science Board Task Force Report on Aerial Refueling Requirements*, May 2004, p. iv.

Airframe Service Life. KC-135s, along with their B-52 counterparts, were originally purchased to give the United States a nuclear strategic strike capability. As a result, both fleets of airplanes spent a significant amount of time during the Cold War on ground alert. Consequently, in 2004, the average KC-135 airframe had flown only about 17,000 hours of an estimated service life of 36,000 hours (KC-135E) or 39,000 hours (KC-135R). Thus, the DSB concluded that KC-135 airframe were viable until 2040 at "current usage rates."[25] The 2006 Rand AOA also concluded that the KC-135 fleet "can operate into the 2040s," but not without risks.[26]

Corrosion. The 2004 DSB Task Force concluded that corrosion did not pose an "imminent catastrophic threat to the KC-135 fleet" and that the Air Force's maintenance practices were postured "to deal with corrosion and other aging problems."[27] The task force went on to say,

> However, because the KC-135s are true first generation turbojet aircraft designed only 50 years from the time man first began to fly, concerns regarding the ability to continue operating these aircraft indefinitely are intuitively well founded.[28]

Maintenance Costs. KC-135 maintenance costs were the subject of widespread concern earlier in this decade. For example, the Government Accountability Office found that KC-135 flying hour costs increased by 29 percent between 1996 and 2002 when adjusted to constant 2002 dollars.[29] In contrast, the 2004 DSB task force agreed that KC-135 maintenance costs had increased significantly, but found they had leveled off due to changes the Air Force made in its KC-135 depot processes. Based on the more current data, DSB forecasted more modest growth in the future.[30]

Outlook. While many believe the Air Force can continue to operate some number of KC-135s for many years, concerns are often expressed about potential maintenance problems that may arise in flying 50 to 80 year-old tankers that could possibly result in the entire KC-135 fleet being grounded. The DSB examined this issue and concluded: "although grounding is possible, the task force assesses the probability as no more likely than that of any other aircraft in the inventory of the Services."[31]

---

[25] Ibid.

[26] Michael Kennedy, et.al., "Analysis of Alternatives (AoA) for KC-135 Recapitalization, Executive Summary," Rand Corporation, 2006, pp. 15-16.

[27] *Defense Science Board Task Force Report on Aerial Refueling Requirements*, May 2004, p. iv.

[28] Ibid, p. 17.

[29] GAO-04-349, "Military Aircraft, DOD needs to Determine Its Aerial Refueling Requirements," June 2004, p. 13.

[30] *Defense Science Board Task Force Report on Aerial Refueling Requirements*, May 2004, pp. iv-v.

[31] Ibid, p. 18.

Rand's AOA was less conclusive. For example, the AOA believe it is possible that KC-135 will be able to operate in the 2040s. However, the AOA lacked confidence that future operation could continue without risks of major maintenance cost increases, poor fleet availability or possible fleetwide grounding. Further, the AOA concluded that "the nation does not currently have sufficient knowledge about the state of the KC-135 fleet to project its technical condition over the next several decades with high confidence."[32] Rand recommended more thorough scientific and technical study of the KC-135 to provide a more reliable basis for future assessments of the condition of the KC-135 fleet.[33]

What is the Lowest Cost Option for Tanker Recapitalization?

In 2004, consistent with congressional direction, the Acting Undersecretary for Defense for Acquisition, Technology and Logistics directed the Air Force to conduct an Analysis for Alternatives (AOA) for air refueling. The AOA had two purposes — first, to identify lowest cost options for recapitalizing the Air Force's KC-135 fleet; and second, to inform recapitalization timing. The Rand Corporation was subsequently selected to conduct the AOA and the findings were independently reviewed for sufficiency both within DOD and by the Institute of Defense Analysis.[34] Rand considered the following alternatives for recapitalization:

- Newly purchased commercial-derivative tankers
- Used commercial-derivative tankers
- Newly purchased military-derivative tankers
- Newly designed tankers
- Unmanned aerial vehicles as tankers
- Stealthy tankers
- Fleets comprised of a combination of the above options
- Commercial sources for air refueling[35]

Rand's AOA identified the present value of the full spectrum of costs associated with the various alternatives. While Rand's AOA considered alternatives with significant passenger and cargo capability, it considered only the costs associated with air refueling. As such, Rand's AOA did not draw conclusions about the impact of various sized aircraft on ramp space and infrastructure in operational scenarios. Rather, Rand's AOA deferred both matters to "senior decision maker judgment."[36] The 2006 AOA presented the following conclusions regarding KC-135 recapitalization:

---

[32] Michael Kennedy, et.al., "Analysis of Alternatives (AoA) for KC-135 Recapitalization, Executive Summary," Rand Corporation, 2006, p. 16.

[33] Ibid.

[34] Michael Kennedy, et.al., "Analysis of Alternatives (AoA) for KC-135 Recapitalization, Executive Summary," Rand Corporation, 2006, p. 1.

[35] Ibid, pp. 7-8.

[36] Ibid, p. 9.

- New commercially-derived tankers of medium to larger size (300,000 to 1,000,000 pound maximum gross takeoff weight) are the most cost-effective alternative. Specifically, the AOA found the Airbus 330 and 340 and the Boeing 747, 767, 777, and 787 all to be viable candidates.
- Small (e.g., Boeing 737 and Airbus 321) and very large (e.g., Airbus 380) are not cost effective alternatives even in mixed fleets with medium to large sized tankers.
- Used commercial aircraft are not as cost-effective as buying new commercial aircraft. However, the cost penalty is not high enough to exclude this option under certain circumstances. (Note: this option will be discussed later in this report).
- New-design tankers are not a cost-effective alternative.
- Unmanned tankers are not a cost-effective alternative.
- "Stealthy tankers are significantly more expensive than non-stealthy tankers, although they offer some effectiveness benefits." The AOA defers to military judgement to determine if the additional capability exists to justify the increased cost
- "There is no compelling reason for the Air Force to outsource aerial refueling." (Note: this option will be discussed later in this report).[37]

How Many Tankers Does the Air Force Need?

Air Refueling requirements ultimately derive from the President's overall national security strategy. Based on the President's strategy, DOD periodically studies the global threat environment and seeks to identify the military force structure necessary to meet national objectives, and articulates this analysis in the National Military Strategy (NMS) and Quadrennial Defense Review (QDR). Next, in the case of air refueling, DOD examines the status of its fleet and quantifies future air refueling requirements to judge whether current programs are sufficient to support DOD force structure and the President's strategy.

Over the past several years, DOD has conducted three studies that have reached similar conclusions about the required size of the Air Force's air refueling fleet. In 2001, DOD released the Tanker Requirements Study 2005 that concluded DOD required 500-600 KC-135R equivalents to meet the NMS in a "pre-9/11" context. During the midst of the Air Force's tanker lease controversy, a Defense Science Board (DSB) task force examined air refueling requirements in May of 2004 with a focus of assessing the urgency of initiating KC-135 recapitalization. In June 2004, DOD began its first "post 9/11" review of transportation requirements. The current Mobility Capability Study (MCS) was completed in December 2005 and briefed to Congress in February 2006.

National Military Strategy (NMS). The 2004 DSB task force focused on assessing the ability of the Air Force's tanker fleet to meet the NMS. The NMS defined what is commonly referred to as the "1-4-2-1" strategy by stating,

---

[37] Ibid, pp. 12-13.

> The force must be sized to defend the US homeland while continuing to operate in and from four forward regions to deter aggression and coercion and set conditions for future operations. Even when committed to a limited number of lesser contingencies, the Armed Forces must retain the capability to swiftly defeat adversaries in two overlapping military campaigns. Additionally, when the President calls for an enduring result in one of the two, the force must have the capability and capacity to win decisively.[38]

Accordingly, the DSB task force found that homeland defense could require "up to 122 KC-135 equivalent tankers ... depending on the number of patrol aircraft aloft."[39] Additionally, the task force identified that "the major driver for future aerial refueling needs is the number and type of nearly simultaneous 'major' operations."[40] As such, the task force examined 2003 operations in Iraq as a basis for informing requirements of a "major" operation. What the task force found was that "direct and indirect" tankers operations in Iraq "peaked at 319" aircraft with 182 aircraft "forward deployed" into Central Command's theater.[41] Further, the task force observed that "one can envision major theater campaigns of greater scale and intensity than [Iraq]." The task force, however, did not analyze the efficiency of tankers used to support Iraq operations.[42] **Table 3** summarizes examples of tankers used during recent operations.

Table 3: Tankers Used in Recent Operations

Conflict	Tankers Utilized
1991 Persian Gulf War (Iraq/Kuwait)	306
1998 Balkans/Kosovo	175
2001 Afghanistan	80
2003 Iraq	305/319*

Source: CRS compiled from data found in DSB Task Force Report on Aerial Refueling Requirements and GAO-04-349.

*DSB reported 319 while GAO cited 305 tankers for Iraq operations.

Based on these studies and assumptions, it has been argued that homeland defense requirements coupled with any two of the aforementioned operations call for an air refueling fleet of at least 500 aircraft as reportedly echoed by the Air Force's 2005 Tanker Requirement Study.

---

[38] "The National Military Strategy of the United States of America," 2004, p. 4.

[39] *Defense Science Board Task Force Report on Aerial Refueling Requirements*, May 2004, p. 28.

[40] Ibid, p. 27.

[41] Ibid.

[42] Ibid.

Mobility Capability Study (MCS). According to the unclassified executive summary of the 2005 MCS, the study assessed the capabilities of the current and projected force by providing a range of potential resource requirements for inter-theater (strategic) airlift, intra-theater (tactical) airlift, and air refueling fleets. The MCS identified a need for between 520 and 640 air refueling aircraft to provide sufficient capability with acceptable risk.[43] By the end of FY2008, the Air Force expects to have between 477 and 514 aircraft (0 to 37 KC-135Es,[44] 418 KC-135Rs, and 59 KC-10s). Thus, by the end of FY2008, the Air Force will potentially possess an air refueling fleet smaller than the one recommended by the MCS.

Some analysts criticized the MCS for its methodology and focus. In September 2005, the Government Accountability Office (GAO) documented a number of shortcomings in methodology for the ongoing MCS.[45] A more detailed GAO criticism followed in September 2006 after the final MCS was released.[46] In light of the criticism, some have called for DOD or an independent agency to conduct another mobility study to rectify the MCS's perceived shortcomings. Consequently, Section 1046 of the 2008 National Defense Authorization Act (P.L. 110-181) directed DOD to conduct a comprehensive requirements-based study of fixed-wing airlift to include full-spectrum life-cycle costs of operating current KC-135 and KC-10 fleets, while also analyzing the impact of planned KC-X aircraft. This study is required to forecasts requirements for 2012, 2018 and 2024 and is due to Congress by January 10, 2009.[47]

What Capabilities Should KC-X Have?

Both KC-X competitors have the potential to significantly improve the airlift capability of DOD's tanker fleet. Some decision makers may wish to consider how much airlift capability the air refueling fleet should provide. Also, based on growing threats, some believe new tankers should be equipped with defensive systems.

Airlift Capability: Doors and Floors. The Air Force envisions KC-X to be built from the outset with reinforced floors necessary for carrying either passengers or cargo in the fuselage, a cargo door sized to facilitate loading and off-loading, and defensive systems enabling a KC-X to operate in certain threat environments. Even

---

[43] "Headquarters Air Mobility Command White Paper, KC-X: The Next Mobility Platform, The Need for a Flexible Tanker," February 28, 2007, p. 4.

[44] Section 135, 2008 National Defense Authorization Act allows the Air Force to retire 48 KC-135Es immediately and provides contingent authority to retire the remaining 37 KC-135Es provided the KC-X contract has been awarded and any subsequent protests resolved. See H.Rept. 110-477, December 6, 2007, pp. 30-31.

[45] *Defense Transportation: Opportunities Exist to Enhance the Credibility of the Current and Future Mobility Capabilities Studies*, Government Accountability Office, September, 2005.

[46] *Defense Transportation: Study Limitations Raise Questions About the Adequacy and Completeness of the Mobility Capabilities Study and Report*, GAO, September 2006.

[47] H.Rept. 110-477, December 6, 2007, pp. 313-316.

though airlift is a secondary mission for KC-X, many believe the Air Force should continue to buy tankers that posses an airlift capabability.

DOD's Position. Several DOD leaders have pushed for airlift capacity on tankers. Some believe the 2006 QDR signaled support for a passenger and cargo requirement for KC-X as it stated, "the Department [of Defense] is also considering the acquisition of a future KC-X aircraft that will have defensive systems and provide significant cargo carrying capacity while supporting its aerial refueling mission."[48] Further, joint doctrine explains the value of having tankers with airlift capability.

> "Additionally, all USAF tanker aircraft are capable of performing an airlift role and are used to augment core airlift assets. Under the dual role concept, air refueling aircraft can transport a combination of passengers and cargo while performing air refueling. In some circumstances, it may be more efficient to employ air refueling aircraft strictly in an airlift role. Deploying air refueling units may be tasked to use their organic capacity to transport unit personnel and support equipment or passengers and cargo from other units. Air refueling aircraft may also be used to support USTRANSCOM airlift requirements."[49]

In April 2006, General Norton Schwartz, Commander of U.S. Transportation Command also expressed a strong preference for a multi-role tanker.

> "What we need is a multi-mission tanker that can do both boom and basket refueling, that can do passenger lift, some cargo lift, and have defensive systems that allow the airplane to go wherever we need to take it....if we're going to war with Iran or Korea or over Taiwan or a major scenario, the first 15 to 30 days are going to be air refueling intensive. But what I'm talking about is the global war on terrorism, sir, for the next 15 or 20 or 25 years. That is not an air refueling intensive scenario and that's why a multi-mission airplane to me makes sense."[50]

How Tankers with Airlift Capability Might be Employed. General Schwartz also expects the KC-X to "mitigate wear and tear on the C-5 and C-17."[51] The following scenario is an example of how a KC-X, with doors, floors, and defensive systems might arguably expand the flexibility of the airlift system. A KC-X while flying a scheduled combat air refueling mission, could be subsequently retasked in-flight, land at an airfield located within a threat environment, upload battle casualties, and air evacuate the patients to needed medical care in another theater. This example illustrates how a KC-X, with defensive systems not currently found on KC-135s, might provide planners with additional options to execute an unplanned medical evacuation sortie — perhaps while also negating the need to tap

---

[48] "Quadrennial Defense Review Report," February 6, 2006, p. 54.

[49] *Joint Publication 3-17*, "Joint Doctrine, Tactics, Techniques, and Procedures for Air Mobility Operations," August 14, 2002, pp. V-1 and V-2.

[50] "Senate Armed Services Subcommittee on Seapower Holds Hearing on FY2007 Budget: Transportation Command." *CQ Congressional Transcripts*. April 4, 2006

[51] General Norton A. Schwartz (USAF), Commander, U.S. Transportation Command, Written Statement before the Senate Homeland Security and Governmental Affairs Committee, Federal Financial Management, Government Information, Federal Services, and International Security Subcommittee, September 27, 2007, p. 6.

a strategic airlift platform. Likewise, this scenario could be applied to the movement of other time-sensitive cargo or passengers. Finally, passenger and cargo capability allows joint commanders the opportunity to deploy aircraft support personnel and associated ground support equipment in tandem with their associated aircraft during aircraft deployment missions.[52] By moving the aircraft, crews, support personnel and equipment together, deploying aviation units may be able to achieve operational status more quickly at their destination.

Airlift Requirements. The Government Accountability Office (GAO) has criticized DOD for including a passenger and cargo requirement in KC-X without conducting required analyses. As a result, GAO made two recommendations to DOD. First, GAO recommended DOD direct the Air Force to determine, through analysis, if there is a gap, shortfall, or redundancy to justify adding a passenger or cargo capability to KC-X and to present results to the Joint Staff's Joint Requirement's Oversight Council (JROC) for validation. DOD did not concur with this recommendation stating they believed the Air Force had presented sufficient analyses to the JROC to justify the addition of a passenger and cargo capability for KC-X. Second, the GAO recommended that DOD direct the Chairman, Joint Chiefs of Staff to notify the Under Secretary of Defense for Acquisition, Technology and Logistics before certifying the KC-X program to Congress. DOD concurred with this recommendation.[53]

Further, according the Air Force's KC-X White Paper, "preliminary results of the in-progress Mobility Capability Study 06 show that tankers are least in demand when airlift assets are stretched most thin during the early deployment phase of a conflict."[54] This may be considered significant to some as the strategic airlift fleet is currently expected to grow to 301 aircraft (190 C-17s and 111 C-5s) — near the bottom of the MCS 05 required range of 292 to 383 strategic airlift aircraft[55].

Cost of Airlift Capability. While many support having an airlift capability on the Air Force's next generation tanker, this capability is not without costs. For example, the 2006 Rand Analysis of Alternatives (AOA) pointed out two potential costs to adding this capability will:

- "Require additional structure and systems, which increase the cost of each aircraft."[56] The AOA found that an air refueling fleet where every aircraft was equipped with airlift capability added 6 percent to

---

[52] *Air Force Doctrine Document 2-6, Air Mobility Operations,* March 1, 2006, p. 48.

[53] GAO-07-367R, "Defense Acquisitions: Air Force Decision to Include a Passenger and Cargo Capability in Its Replacement Refueling Aircraft Was Made without Required Analysis," March 6, 2007, p. 17.

[54] "Headquarters Air Mobility Command White Paper, KC-X: The Next Mobility Platform, The Need for a Flexible Tanker," February 28, 2007, p. 6.

[55] Ibid, p. 4.

[56] Michael Kennedy, et.al., "Analysis of Alternatives (AoA) for KC-135 Recapitalization, Executive Summary," Rand Corporation, 2006, p. 9.

total life-cycle costs compared to a fleet where no tankers were equipped with passenger and cargo capability.[57]

- Increase fleet requirements because "the weight of the additional structure and systems means that each aircraft can carry less fuel."[58]

Summary of Airlift Analysis. The Rand AOA found that the cost-benefit analysis of adding an airlift capability in future tankers to be "a matter for senior decisionmaker judgment."[59] The amount of airlift ultimately to be provided by the tanker fleet could have important implications for other air mobility programs.

Defensive Systems. Defensive systems facilitate a tanker aircraft's primary mission of in-flight air refueling by potentially enabling the tanker to operate closer to its refueling track, thus, making more fuel available on each mission. Operations in Iraq and Afghanistan have found tankers operating in an increasingly hostile threat environment. For example, the Air Force points out that tankers operating in U.S. Central Command's theater were fired upon 19 times in FY2006. Additionally, defensive systems also increase a tanker's capability in its secondary mission of airlift.[60]

How Will KC-X Fit with Future Tanker Requirements?

Some may question how the KC-X will fit into DOD operational constructs that emerge as the KC-X ages. Some events could drive future tanker requirements higher. For example, the DSB postulated that if Army and Marine forces reduced organic firepower, they may require additional air support in the future. Other changes could have an opposite effect on air refueling requirements. Again, the DSB questioned whether 5th Generation fighters being acquired by DOD such as the F-22 and F-35 would have sufficient range to require only one air refueling during operational sorties in contrast to current fighters that typically require refueling on both ingress and egress legs.[61]

The Air Force description of the 179-aircraft KC-X program portrays it as the first of three potential efforts — followed by the KC-Y and KC-Z, which combined, would recapitalize the Air Force's entire tanker fleet.[62] Reportedly, in

> "About 2023, the Air Force plans to contract for a second batch of tankers, dubbed KC-Y, and in 2033, it goes for the third or KC-Z batch, ultimately retiring all KC-135s along the way. At no time are tanker purchases expected to

---

[57] Ibid, p. 14.

[58] Ibid, p. 9.

[59] Ibid.

[60] "Headquarters Air Mobility Command White Paper, KC-X: The Next Mobility Platform, The Need for a Flexible Tanker," February 28, 2007, p. 3.

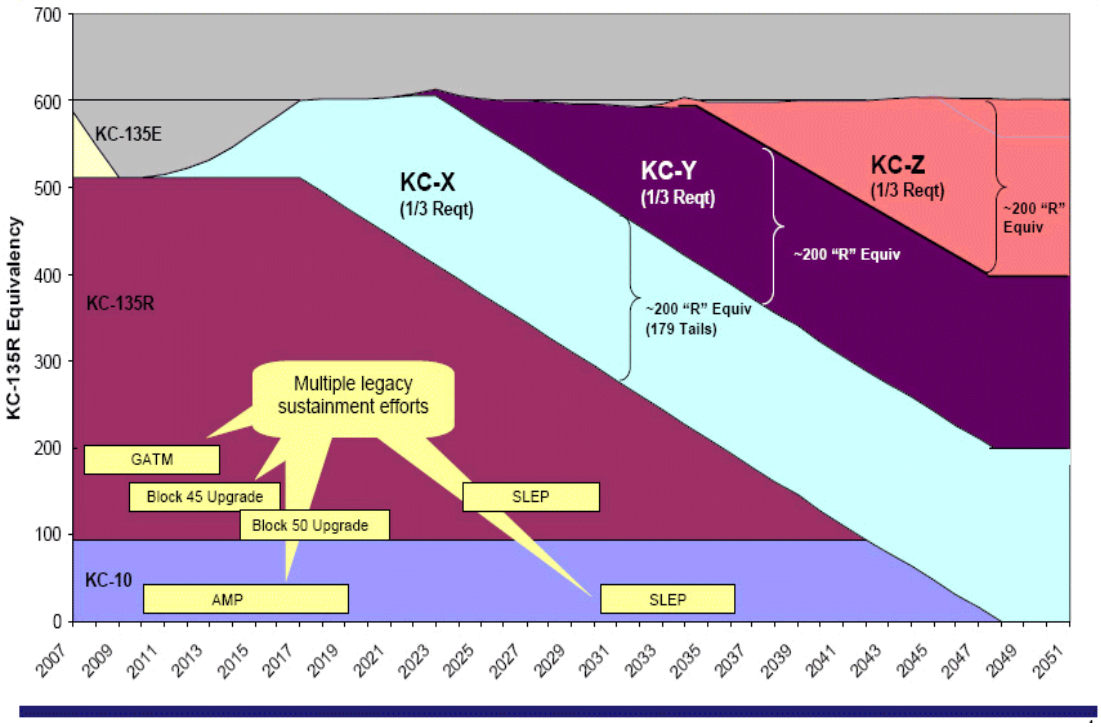
[61] *Defense Science Board Task Force Report on Aerial Refueling Requirements*, May 2004, p. 28.

[62] Meeting between CRS and SAF/AQQ April 4, 2006, and follow-on interviews.

> exceed $3 billion a year in current dollars; that's all the Air Force expects to be able to spend. For that money, the service expects to be able to buy between 12 and 18 per year, replacing the entire tanker fleet over 40 years."[63]

This conceptual framework could potentially give DOD flexibility to tailor its fleet of air refueling aircraft in both design and quantity to meet requirement changes as both KC-Y and KC-Z are potentially pursued. However, the three-pronged approach may indicate implicit Air Force recognition that 540 new aircraft are likely unaffordable in light of other budget priorities. **Figure 3** below illustrates current Air Force acquisition and modernization plans for the air refueling fleet.

Figure 3. Air Force Tanker Recapitalization Plan



Source: "The 40-Year Plan," *Daily Report*,Air Force Association, February 21, 2008, online at [http://dailyreport.afa.org/AFA/datapoints/2008/dp022108tankers.htm].

Was the KC-X Competition Fair?

In 2006, Rand Corporation concluded an Analysis of Alternatives (AOA) for recapitalizing the Air Force's KC-135 fleet. Rand found that purchasing new commercially-derived tankers was the most cost effective means of initially recapitalizing the fleet.[64] As a result, the Air Force released a formal request for

---

[63] John A. Tirpak, "The ABCs of Tanker XYZs," *Air Force Association Daily Report*, August 8, 2007, online at [http://dc01-cdh-afa03.tranguard.net/AFA/Reports/2007/Month08/Day08/1040abc.htm].

[64] KC-135 Recapitalization Analysis of Alternatives. Briefing to Congress. January 26-27,

(continued...)

proposals (RFP) in early 2007.[65] Boeing responded to the RFP with the KC-767, a variant of the commercial 767-200, while Northrop Grumman teamed with European Air Defense Systems (EADS) to offer a tanker version of the Airbus 330-200. The Air Force is expected to announce source selection soon.

Request for Proposal. In January 2007, the Air Force released its formal Request for Proposal (RFP) for the KC-X acquisition program. Assistant Secretary of the Air Force, Sue Payton, reportedly emphasized that the Air Force had completed a rigorous review process for KC-X to ensure the RFP mirrors joint war-fighting requirements.[66] The RFP outlined nine primary key performance parameters:

- Air refueling capability
- Fuel offload and range at least as great as the KC-135
- Compliant Communication, Navigation, Surveillance/Air Traffic Management (CNS/ATM) equipment
- Airlift capability
- Ability to take on fuel while airborne
- Sufficient force protection measures
- Ability to network into the information available in the battle space
- Survivability measures (defensive systems, Electro-Magnetic Pulse (EMP) hardening, chemical/biological protection, etc)
- Provisioning for a multi-point refueling system to support Navy and Allied aircraft[67]

In November 2007, Ms. Payton explained the evaluation criterion that the Air Force used in determining the KC-X competition. The KC-X evaluation factors are:

- Factor 1 - Mission Capability. Mission capability includes five subfactors listed in descending order of importance:
  - Subfactor 1.1 - Key System Requirements
  - Subfactor 1.2 - Subsystem Integration and Software
  - Subfactor 1.3 - Product Support
  - Subfactor 1.4 - Program Management
  - Subfactor 1.5 - Technology Maturity and Demonstration
- Factor 2 - Proposal Risk
- Factor 3 - Past Performance
- Factor 4 - Cost/Price

---

[64] (...continued)
2006.

[65] "Air Force Posts KC-X Request for Proposals," *Air Force Print News Today,* January 31, 2007 online at [http://www.af.mil/news/story.asp?id=123039360].

[66] "Air Force Posts KC-X Request for Proposals," *Air Force Print News Today*, Press Release 070107, January 30, 2007 online at [http://www.af.mil/pressreleases/story_print.asp?id=123039273].

[67] Ibid.

- Factor 5 - Integrated Fleet Air Refueling Assessment[68]

The Air Force considered the first three KC-X evaluation factors of equal importance. The final two factors were considered of equal importance, but less important relative to the first three criterion. Lastly, the Air Force regarded "Factors 1, 2, 3, and 5, when combined, [to be] significantly more important than factor 4."[69]

RFP Analysis. There has been much dialogue in the media that the first draft of the KC-X request for proposal (RFP) was biased toward the capabilities apparent in Boeing's KC-767. Close review of this RFP is understandable in light of the controversy surrounding past tanker recapitalization efforts. It is important to note within this context, that the driving force behind DOD's overall weapon acquisition system is intended to be warfighter requirements, not what is most profitable to "Company X" or "Company Y." Northrop Grumman and Airbus reportedly complained that the original KC-X RFP did not adequately address how the Air Force would evaluate the candidate aircraft's airlift capability. Reportedly, they feared that the Air Force might not weight the score of KC-30's airlift capabilities in a favorable manner.

In the absence of detailed airlift evaluation information, however, Airbus could have offered a smaller aircraft, such as its A300/A310 class, which it might believe corresponded more closely to Air Force requirements.[70] Similarly, if Boeing believed the Air Force desired a larger aircraft with more airlift capability, it could have conceivably offered its 777 aircraft.

Reduced demand of defense-unique systems and the resulting consolidation of the defense industrial base has frequently reduced the number of companies available to provide a given defense article, which adversely affects competition. Therefore, often some compromise between a warfighter's "perfect world" requirements and real world industrial capabilities is unavoidable. However, substantially modifying warfighter requirements or Key Performance Parameters (KPPs) to jibe with what industry wants to offer, may appear to some to reflect an imbalance between requirements and capabilities.

As DOD defines its requirement, there appears to be nothing obvious in the KC-X RFP that would inherently bias the contract award in favor of any platform that could be offered by the competitors. The RFP makes clear, however, that the aircraft's primary mission is refueling DOD and allied aircraft with the flying boom mechanism. Any passenger or cargo carrying capability is deemed a "secondary mission." Additionally, at the beginning stages of its recapitalization program, the

---

[68] USAF slide obtained from "Performance Comes First," Air Force Association Daily Report, November 21, 2007 online at [http://dailyreport.afa.org/AFA/Reports/2007/Month11/Day21/1028factors.htm].

[69] Ibid.

[70] The last A300/A310 class aircraft were produced in 2007 and the A300/A310 production line was terminated. However, if Airbus believed that a smaller sized tanker was more compatible with Air Force requirements and therefore more competitive than a larger A330-class aircraft, Airbus could have taken steps to keep the line available for production.

Air Force potentially has great flexibility in pursing the best KC-X match now as requirements for planned programs such as KC-Y and KC-Z can later be adapted to best complement the KC-X selection.

Comparing the Competitors. Analysts expect that both competitors' proposals will offer key improvements over the KC-135 by including:

- Receiver in-flight refueling capability
- Defensive systems
- Advanced booms capable of refueling both "boom" and "drogue" receivers on the same mission
- Improved airlift capacity and utility
- Wing-mounted pods for hose and drogue systems.

However, debate surrounding the competing proposals often focuses on differences in size. The following is a brief description of both the Boeing KC-767 and Northrop Grumman/EADS KC-30 aircraft submissions along with highlights of some issues frequently raised through the media.

Boeing KC-767. Boeing touted its entrant, a version of the Boeing 767-200 as the "right-sized" tanker. Proponents of the KC-767 argue that it is most similar in size and offload capacity to the KC-135. Further, proponents stated that the KC-767's smaller "footprint" compared to the competing KC-30 might enable it to better utilize potentially limited ramp space in forward operating locations. Additionally, proponents believed the smaller KC-767 to be potentially more fuel efficient due to its lower gross weight leading to less fuel being burned in transit.[71] Lastly, proponents pointed to the KC-767 as an "American made" product. Selected KC-767 aircraft specifications are listed in **Appendix E**.

Northrop Grumman/EADS KC-30. Northrop Grumman, on the other hand, believed the KC-30, based on the Airbus 330-200, offered superior value in comparison to the KC-767 because of its larger size. KC-30 proponents espoused the aircraft's potentially greater fuel offload capability and larger airlift capacity in terms of weight, pallet positions and passengers when compared to the KC-767. As a result, KC-30 proponents believed their aircraft would reduce the number of aircraft required to meet some potential operational scenarios.[72] Additionally, Northrop Grumman/EADS announced plans in January 2008 to conduct final assembly of all freighter versions of the Airbus 330-200 in Mobile, Alabama — raising the potential for creating new domestic jobs if their candidate were chosen.[73] Selected KC-30 aircraft specifications are listed in **Appendix F.**

International Customers. Both competitors have secured international customers. Boeing currently has two international customers for the KC-767 — Italy

---

[71] On-line at [http://www.boeing.com].

[72] "KC-30 Tanker: Total Air Mobility," online at [http://www.northropgrumman.com/kc30].

[73] Jen DiMascio, "Airbus Vows to Boost Business in Alabama If it Can Make Tankers There," *Defense Daily*, Vol. 237, Issue 9, January 15, 2008.

(4) and Japan (4).[74] Likewise, Saudi Arabia (3),[75] Australia (5), the United Arab Emirates (3), and the United Kingdom (14) plan to buy the KC-30 from Airbus, a division of EADS.[76] While some look to the international orders as a potential signpost for how the Air Force's KC-X selection should proceed, others will point out that each country has made its selection based on the unique military requirements that face each nation. Likewise, DOD's requirements may differ considerably from other nations that have recently purchased tanker aircraft.

Should the Air Force Pursue a "Split-Buy"?

Some have suggested that the Air Force should split its KC-X acquisition program between Boeing and Northrop Grumman/Airbus. Rand's analysis of alternatives found that, "a mixed [Air Force tanker] fleet ... has comparable cost-effectiveness, so there is no reason to exclude a priori an Airbus-Boeing mixed buy on cost-effectiveness grounds."[77] Others, including 66 Members of Congress, have indicated they believe that "the Air Force's "winner take all" KC-X competition remains the most cost-effective approach to initiating modernization of the tanker fleet."[78] Further, some have suggested that the idea of a split buy is being touted by the Northrop Grumman/Airbus team as a hedge against potentially losing the KC-X deal.[79]

Arguments Favoring a Split Buy. A leading proponent of "split buy" KC-X acquisition is Dr. Jacques Gansler, a former Under Secretary of Defense for Acquisition, Technology and Logistics during the Clinton Administration. Dr. Gansler has termed his proposal as "Competitive Dual Sourcing" — a concept that would have Boeing and Northrop Grumman compete annually/periodically — as often as DOD were to reopen bidding — for portions of the KC-X acquisition. Dr. Gansler believes that "Competitive Dual Sourcing" is a particularly good fit for the KC-X program as both competing aircraft already have established worldwide logistics networks. Dr. Gansler's analysis is based on comparisons of the cost growth for ten DOD aircraft programs developed without production competition to the cost of seven commercial aircraft produced in a competitive environment. He found the ten single-source DOD acquisition programs had an average cost increase of 46

---

[74] "The Boeing Company: Boeing 767 Military Versions," *Jane's All The World's Aircraft*, March 14, 2007, online at [http://www.janes.com].

[75] Marcus Weisgerber, "Saudi Arabia to Buy Three Airbus A-330 Multirole Tankers, EADS Says," *Inside the Air Force,* January 4, 2008.

[76] "Airbus Industrie: Airbus Multirole Tanker Transport (MRTT)," *Jane's All The World's Aircraft*, January 21, 2008, online at [http://www.janes.com].

[77] Michael Kennedy, et.al., "Analysis of Alternatives (AoA) for KC-135 Recapitalization, Executive Summary," Rand Corporation, 2006, p. 12.

[78] Letter from Members of the House of Representatives to Secretary of the Air Force Michael Wynne, October 2, 2007, obtained online at [http://www.insidedefense.com/secure/data_extra/pdf6/dplus2007_3355_1.pdf].

[79] Demetri Sevastopulo, "U.S. Air Force Will Not Split Tanker Contract," *Financial Times*, August 6, 2007.

percent, while the average of the seven competitively produced commercial airliners had an average cost decrease of 16 percent over the life of the program.

When analyzing potential savings for the KC-X program, Dr. Gansler, assumed a purchase of 100 new tankers with a base price of $125 million dollars and a 75/25 split favoring the best-value candidate.[80] Based on these assumptions, he found a competitively sourced tanker acquisition would potentially generate $7.7 billion in cost savings compared to a single source tanker program provided the cost growth averages of the single-source and competitively sourced aircraft programs examined earlier in his study were repeated in the KC-X program.[81] Some may counter that Dr. Gansler's study does not definitively conclude dual-sourcing will garner savings or that the magnitude of potential savings would outweigh operational costs, thus resulting in a lower life-cycle cost for DOD. However, proponents may counter that the quantity of the Air Force's projected KC-X purchase — 179 aircraft compared to 100 aircraft in Dr. Gansler's study — could potentially yield greater savings than those found in the study.

Arguments Against a Split Buy. Opponents have expressed opposition to a split buy acquisition strategy for a variety of reasons. Secretary of the Air Force Michael Wynne reportedly believes the Air Force lacks funding to buy tankers in sufficient numbers to justify a split arrangement as he stated, "the cost of that would be prohibitive, unless there was sufficient funding to essentially buy between 24 and 30 [annually]."[82] One analyst cited the cost of maintaining separate supply chains and dual training programs for aircrew and mechanics when he stated, "dual sourcing is a bad idea that would waste billions."[83] In addition to the costs of operating an air refueling fleet comprised of potentially four aircraft (KC-10, KC-135, KC-30 and KC-767) some in Congress believe a split purchase would add needless operational complexity. Those that hold this view believe the planned fleet — consisting of three tanker aircraft types — will already provide flexibility. Further, some have noted the Air Force plans at least two additional tanker competitions (KC-Y and KC-Z) in the future.[84] To some, these potential future programs offer avenues to reopen competition in the future. Further, a senior Air Force official reportedly told members of Congress that shifting to a split-buy acquisition strategy would result in a contract delay of 12 to 18 months while doubling development costs to $4 billion.[85]

---

[80] Dr. Gansler's analysis considered a 75/25 split to be illustrative and found other splits such as 60/40, etc. could be expected to produce similar savings.

[81] Jacques S. Gansler and William Lucyshyn, "Competition in the USAF Tanker Replacement Program," presentation slides, June 12, 2006, slides 18-19, 24, 35, and 40.

[82] Andrea Shalal-Esa, "U.S. Air Force Sees Single Tanker Winner," *Reuters*, December 4, 2007.

[83] George Talbot, "Lawmakers: Don't Split Tanker Contract; Boeing Supporters — 14 Senators and 48 Representatives — Write to Air Force," *Mobile Press-Register*, October 13, 2007.

[84] Letter from Senators to Secretary of the Air Force Michael Wynne, October 10, 2007, online at [http://www.insidedefense.com/secure/data_extra/pdf6/dplus2007_3355_2.pdf].

[85] Andrea Shalal-Esa, "Split Buy of U.S. Tankers Could Save Billions - Study," *Reuters*, (continued...)

Where Might KC-X Aircraft Be Based?

Aircraft basing decisions are often based on operational considerations, available infrastructure, and environmental impact among other concerns.

In January 2008, the Air Force released an "Air Force Roadmap" for each of it major mission areas. The Roadmap lists the following as potential bases "being considered" for new KC-X aircraft: Altus AFB, OK; Andrews AFB, MD; Bangor International Airport, ME; Birmingham International Airport, AL; Edwards AFB, CA; Eielson AFB, AK; Forbes Field, KA; Grand Forks AFB, ND; Grissom Air Reserve Base, IN; Hickam AFB, HI; Lincoln Municipal Airport, NE; MacDill AFB, FL; March Air Reserve Base, CA; McConnell AFB, KS; McGhee Tyson Airport, TN; McGuire AFB, NJ; Pease Air National Guard Base, NH; Phoenix Sky Harbor International Airport, AZ; Pittsburgh International Airport, PA; Rickenbacker International Airport, OH; Salt Lake City International Airport, UT; Scott AFB, IL; Selfridge Air National Guard Base, MI; Seymour Johnson AFB, NC; Sioux Gateway Airport, IA; and Tinker AFB, OK.[86]

What Are Other Recapitalization Alternatives?

Rand's 2006 Analysis of Alternative's (AOA) concluded that purchasing new aircraft to recapitalize DOD's tanker fleet is the least expensive option for recapitalizing the KC-135 fleet — a view widely shared among defense analysts. However, this course of action is also capital intensive when compared with other potential courses of action. Rand's AOA noted that "affordability (annual budget outlays)" was an important factor that should "drive the acquisition schedule for tanker recapitalization."[87] The earlier DSB Task Force on Aerial Refueling proposed less capital-intensive recapitalization options that remain available for consideration. Some additional alternatives to new tankers are:

- Buy and convert surplus commercial aircraft into military tankers
- Re-engining some fraction of the KC-135E fleet
- Develop commercial Fee-For-Service aerial refueling (FFS AR)

Convert Used Commercial Aircraft into Tankers. The Air Force has argued against purchasing surplus commercial aircraft and converting them into military tankers. However, Rand's AOA appears to agree with the earlier DSB study — although with distinct caveats — that purchasing used aircraft may merit additional study. Rand's AOA found that purchasing used aircraft as tankers is

---

[85] (...continued)
August 3, 2007.

[86] "Air Force Roadmap," on-line at [http://www.af.mil/library/airforceroadmap/globalreach.asp].

[87] Michael Kennedy, et.al., "Analysis of Alternatives (AoA) for KC-135 Recapitalization, Executive Summary," Rand Corporation, 2006, p. 5.

"generally not as cost effective" (as purchasing new aircraft), but "...close enough in estimated cost to not exclude it from competition."[88]

Some have suggested that surplus DC-10 aircraft, in particular, might offer attractive means of acquiring air refueling capabilities for less money up-front.[89] Those that hold this view point out the Air Force already operates the similar KC-10 — a commercial derivative that "retains 88 percent systems commonality with the DC-10."[90] Thus, significant additional investments may not be required in operations, maintenance, and supply if surplus DC-10s were procured and converted into Air Force tankers. Likewise, some may suggest that surplus aircraft of the design selected in the KC-X competition may also be worthy of future consideration. Both of these options would seem to assuage Air Force concerns of adding additional aircraft types to the air refueling fleet. While it is unlikely that a large portion of the Air Force's air refueling fleet could be recapitalized with used commercial aircraft, proponents of this alternative may believe that even a small number of used aircraft could potentially free scarce budget dollars for other DOD priorities.

In contrast, some have questioned the feasibility of this approach. A 2004 Government Accountability Office (GAO) study pointed out that there can be a wide variance in the amount of use the Air Force could expect from used commercial aircraft — some are relatively new with low flying hours while others are older with high flying hours.[91] The GAO also questioned whether owners would be willing to sell the Air Force available suitable aircraft.[92] Further, each potential used aircraft may require a unique cost analysis based on airframe service life remaining and the cost of equipping the aircraft to match like-model airplanes already operating in the Air Force's fleet. Additionally, given Air Force opposition to "split-buy" proposals, it is unlikely the Air Force would support bringing additional aircraft types into its inventory due to the associated costs for maintenance, spare parts, and crew training.

A factor of potential significance that has arisen subsequent to most of the independent studies cited in this report is the rising operating costs due to increased jet fuel prices. This is of particular importance with older, less fuel-efficient aircraft. According to the International Air Transport Association, the average cost of a barrel of jet fuel rose from $34.70 in 2003 to $81.90 in 2006.[93] As a result, Northwest Airlines — the last major U.S. passenger airline to operate the DC-10 — announced

---

[88] Ibid, p. 12.

[89] *Defense Science Board Task Force Report on Aerial Refueling Requirements*, May 2004, p. 36.

[90] USAF Fact Sheet, KC-10 Extender, September, 2006, online at [http://www.af.mil/factsheets/factsheet.asp?id=109].

[91] *Military Aircraft: DOD Needs to Determine Its Aerial Refueling Aircraft Requirements*, GAO-04-349, Washington, D.C., June 2004, p. 27.

[92] Ibid.

[93] "IATA Economic Briefing: Airline Fuel and Labour Cost Share," International Air Transport Association, June 2007, p. 1, online at [http://www.iata.org/NR/rdonlyres/4A49F6DA-2B12-48A9-A283-E035AEA5D165/0/Airline_Labour_Cost_Share.pdf].

it would accelerate retirement of its DC-10 fleet.[94] In January 2007, Northwest removed the DC-10 from scheduled service replacing it with new airliners expected to provide fuel savings of 35 percent.[95] Since the Northwest retired its last DC-10, jet fuel prices have risen 62 percent to $116.00 per barrel in February 2008.[96] Thus, some may question the economic merits of converting older airliners into tankers for the Air Force.

Retire or Re-engine KC-135Es. Some have suggested modernizing the KC-135E models into more capable "R" models as an approach to recapitalizing the KC-135 fleet. In contrast, Air Force officials have consistently expressed a desire to retire the "E" model fleet. Both Rand and the DSB made observations about the KC-135 that may be useful in informing decisions about the KC-135E fleet.

Viability of the KC-135E Fleet. In a 2001 study the Air Force concluded that the KC-135E fleet is "structurally viable until 2040."[97] A 2005 Air Force Study estimated — with numerous caveats — that KC-135E aircraft upgraded to the "R" configuration would remain viable until 2030.[98] Further, the 2004 DSB Task force pointed out that the engine struts that attach KC-135E-model engines to the aircraft's wing are at the end of their service life. The close proximity of the strut to the engine subjects the struts to high temperatures and corrosive environments. If the KC-135Es were to be retained, but not re-engined, a major structural repair would have to be accomplished.[99]

Recapturing Modernization Costs. Rand's AOA did not rule out re-engining some KC-135Es. However, the AOA determined conversion would only bolster overall fleet effectiveness by about 2 percent. The study also found that re-engining "E" models was "not a favorable return on investment unless operated into late 2030s."[100] Air Force leadership believes that dollars necessary to modernize the "E" models are better spent on KC-X. For example, Secretary of the Air Force, Michael Wynne testified to Congress in October 2007 that,

---

[94] Perry Flint, Air Transport World's *Daily News*, June 29, 2006, online at [http://www.atwonline.com/news/other.html?issueDate=6/29/2006].

[95] Press Release, "Northwest Brings Customer Comforts of Airbus A330 Aircraft to Twin Cities-Honolulu route: Airline Completes Retirement of DC-10 Fleet After 34 Years of Service," Minneapolis, January 8, 2007, online at [http://www.nwa.com/corpinfo/newsc/2007/pr010820071733.html].

[96] "Jet Fuel Price Monitor," International Air Transport Association, February 15, 2008, online at [http://www.iata.org/whatwedo/economics/fuel_monitor/index.htm].

[97] *KC-135 Economic Service Life Study*. Technical Report. February 9, 2001.

[98] *KC-135 Assessment Report*. Air Force Fleet Viability Board. September 2005.

[99] *Defense Science Board Task Force Report on Aerial Refueling Requirements*, May 2004, pp. iv-v.

[100] Michael Kennedy, et.al., "Analysis of Alternatives (AoA) for KC-135 Recapitalization, Executive Summary," Rand Corporation, 2006, p. 15.

> "One thing that's for sure is that we have 44-year- old tankers. One thing for sure is that some of those tankers will go to age 75 before we can retire them, simply because of affordability — that we cannot afford the rate of growth. Even if we were to award today, we can forecast that they would be 75 years old.
>
> Our plan is to go ahead and put that program into action — retire the KC-135Es with the accession of the KC-X. And our plan then is to essentially prolong the best of the KC-135Rs until we can fully replace and amortize those. The KC-10s as well will look like they're going to span and work for another 20 to 25 years."[101]

Air Force officials often cite risk, reliability and operational concerns associated with operating the aging KC-135E fleet. During congressional testimony, Air Force Chief of Staff, General T. Michael Moseley expressed concern with continuing to operate a tanker fleet largely dependent on the aging KC-135,

> "The airplanes were designed in the 1950s, and those airplanes were built during the Eisenhower administration, and the structure on those airplanes is not a modern structure.
>
> We've also operated those airplanes now for about 40 years, so the money spent on modification of one of the old airplanes is you still have an old airplane. My fear, when I'm asked what do you worry about at night, is a catastrophic failure of one of these 707 airframes that we ground the entire fleet. And the impact we will have on the strategic setting of no jet tanker, sir, I believe is an unacceptable risk."[102]

Additionally, during testimony, Secretary Wynne cited maintenance concerns stating,

> "The problem is that we have 85 active KC-135Es. We only have 40 that can fly. Of those 40, more than 13 are being stood down locally by their commanders because they don't want to fly them. They break too often, and they suck their maintenance out."[103]

General Moseley explained KC-135E operational limitations when he testified,

> "And we only fly the KC-135Es in the vicinity of the airfield for Operation Noble Eagle and for the Northeast Tanker Task Force. We don't deploy them. We can't take them into theater. We can't lift the weight. We can't operate at the temperatures with this airplane. And by the spring of [2010], all of them are now grounded because of the pylons and the structure."[104]

---

[101] House Armed Services Committee Holds Hearing on Air Force Strategic Initiatives, October 24, 2007.

[102] Ibid.

[103] Ibid.

[104] Ibid.

Legislative Action. The 2004 National Defense Authorization Act (NDAA) allowed the Air Force to retire 12 KC-135Es.[105] However, both the 2005 and 2006 NDAAs prohibited the Air Force from retiring KC-135Es.[106] The 2007 NDAA allowed the Air Force to retire no more than 29 KC-135Es in FY2007 while stipulating that all "E" models retired after September 30, 2006 be stored in a manner that would allow their later recall.[107] The 2008 NDAA allowed the Air Force to retire an additional 48 aircraft and provided conditional authority to retire the remaining 37 KC-135Es upon award of the KC-X contract and after any subsequent protests are settled favorably.[108]

Fee-For-Service Air Refueling. Fee-for-Service air refueling (FFS AR) is a potential program where the Air Force may outsource a portion of its air refueling requirements to a defense contractor. Both the 2004 DSB task force and the 2006 Rand AOA addressed FFS AR although some may question the assumptions Rand's analysis was based upon. Additionally, some Air Force officials have questioned how much potential interest there may be in the commercial sector to provide the necessary capital investment required to develop a fleet of aircraft with air refueling capability.[109] Currently, there is one commercial FFS AR operator, and the United Kingdom's Royal Air Force is planning to recapitalize it's aging tanker fleet with a type of FFS AR program. The Air Force has been publically supportive of studying FFS AR, but cautious based on concerns FFS AR may divert funds from its KC-X.[110] The 2008 National Defense Authorization Act stipulated that DOD must further study the FFS AR concept.

What Independent Studies Say. The 2004 DSB Task force recommended that the Air Force consider "arranging for contractors to provide some of the aerial refueling needs."[111] In contrast, Rand's AOA concluded,

> "There is no compelling reason for the Air Force to outsource aerial refueling, that is, to purchase aerial-refueling capability from private companies instead of providing it organically."[112]

Rand's AOA reached this conclusion based on two underlying assumptions. First, the AOA assumed that "all tanker aircraft must carry a common wartime set of

---

[105] H.Rept. 108-354, Section 134, Conference Report to Accompany H.R. 1588, p. 23.

[106] H.Rept. 108-767, Section 131, Conference Report to Accompany H.R. 4200, p. 19 and H.Rept. 109-360, Section 132, Conference Report to Accompany H.R. 1815, p. 28.

[107] H.Rept. 109-702, Section 135, Conference Report to Accompany H.R. 5122, p. 33.

[108] H.Rept. 110-477, Section 135, Conference Report to Accompany H.R. 1585, pp. 30-31.

[109] "Filler' Up," *Defense Daily,* February 19, 2008, Volume 237, Issue 32.

[110] Caitlin Harrington, "USAF Pushes for 'Fee-For-Service' Aerial Refueling Programme," *Jane's Defence Weekly,* October 31, 2007, online at [http://www.janes.com].

[111] *Defense Science Board Task Force Report on Aerial Refueling Requirements,* May 2004, p. ix.

[112] Michael Kennedy, et.al., "Analysis of Alternatives (AoA) for KC-135 Recapitalization, Executive Summary," Rand Corporation, 2006, p. 13.

equipment ... be capable of carrying out wartime missions," and "be capable of sustaining the high operational tempo associated with wartime."[113] Thus, the AOA found that based on these requirements, there was "no demonstrable large-scale cost savings associated with tanker outsourcing."[114] Second, the AOA believed that the fact that contract tanker operators could also use their aircraft to generate revenue through the commercial marketplace (e.g., flying cargo flights) while the Air Force is prohibited from serving commercial markets distorted side-by-side comparisons of FFS AR with organic air refueling assests.

Counter Arguments to Rand's Assumptions. Proponents of FFS AR may point out that while commercial air carriers may have limitations from participating in combat, they can still make a contribution during wartime. For example, United States Transportation Command has access to a large number of commercial airliners during contingencies through the Civil Reserve Air Fleet (CRAF).[115] Just as CRAF airliners are able to supplement DOD's organic airlift capabilities during surge wartime operations, there may be air refueling contributions FFS AR partners can make during wartime as well. For example, perhaps FFS AR contractors could help keep training pipelines open, refuel homeland defense aircraft, or facilitate deployment across transoceanic air bridges — all missions organic tankers would need to perform during wartime, but missions that would not likely expose civilians to combat. CRAF partners, often receive a portion of DOD's contract airlift business in exchange for their participation in the program. Further, CRAF partners remain active in the commercial marketplace. In the same way a FFS AR contractor may desire to configure the fuselage of their tankers to carry cargo, thus, giving FFS AR the ability to pursue both government and commercial contracts.

FFS AR Examples. Currently, Omega Air Refueling Services operates two converted Boeing 707s as a FFS AR carrier servicing the U.S. Navy. Omega also expects to add a converted DC-10 early in 2008.[116] Reportedly, Omega would like to perform FFS AR for the Air Force as well.[117]

The United Kingdom's Royal Air Force (RAF) is currently pursing plans to meet its future air refueling needs through a type of FFS AR program known as the Future Strategic Tanker Aircraft (FSTA) program. In 2004, Air Tanker, a consortium of companies including the VT Group, European Aeronautic Defence and Space Company (EADS), and Rolls-Royce, was selected to manage the FSTA program using the Airbus 330-200.[118] FSTA is a private-finance initiative whereby the RAF

---

[113] Ibid.

[114] Ibid.

[115] For more on CRAF see CRS Report RL33692, Civil Reserve Air Fleet by Christopher Bolkcom, July 19, 2007.

[116] www.omegaairrefueling.com.

[117] Caitlin Harrington, "USAF Pushes for 'Fee-For-Service' Aerial Refueling Programme," *Jane's Defence Weekly*, October 31, 2007, online at [http://www.janes.com].

[118] "Airbuse A330 - EADS KC-330 Tanker/Transport," *Jane's Aircraft Upgrades*, August
(continued...)

will pay on a "tanker-for-hire" basis subject to agreed upon minimum usage rates.[119] When the planes are not being used by the RAF, Air Tanker would be able to offer them for hire, presumably as transports, in commercial markets.[120] However, funding for the FSTA program has proven problematic and a final contract has yet to be signed. Service entry is now expected in 2013 — a five-year delay from original plans.[121] Crewing of the planes has also been viewed by some as controversial. Plans call for flying the planes with a core group of RAF pilots while supplementing those crews with Air Tanker pilots that will be required to maintain "reserve" status with the RAF. This arrangement is expected to provide sufficient RAF aircrew to fill normal peacetime requirements as well as a group of pilots that can fly in either civilian or military status as requirements dictate.[122]

Legislative Action. The 2008 National Defense Authorization Act (NDAA) directs the Air Force to conduct a pilot program of at least five years to evaluate the feasibility of FFS AR (P.L. 110-181). The evaluation requires the Air Force to assess FFS AR across a broad range of mission sets to include testing support, training support to receiver aircraft, homeland defense, deployment support, air bridge support, aeromedical evacuation and emergency air refueling while integrating FFS AR into Air Mobility Command's day-to-day operations. Further Congress has required the Air Force to submit an annual report to Congressional defense committees highlighting key operational metrics and assessing the impact of FFS AR on the Air Force's flying hour program and aircrew training. Finally, the 2008 NDAA requires the Comptroller General's office to conduct an annual review with recommendations for improvement of the Air Force's FFS AR pilot program as well as a final analysis of the pilot program upon program completion (P.L. 110-181).[123] Reportedly, the Air Force plans to release a sources sought request for information to gauge industry interest and cost projections for the required FFS AR pilot program.[124]

---

[118] (...continued)
17, 2007, online at [http://www.janes.com].

[119] Keri Smith, "Air Tanker Remains Confident FSTA is on Track,"*Jane's Defence Weekly*, October 31, 2007, on-line at [http://www.janes.com].

[120] Nick Cook, "Tanker PFI is a Pathfinder for Procurement," *Jane's International Defence Review*, January, 1, 2003, on-line at [http://www.janes.com].

[121] "Procurement: United Kingdom," *Jane's Sentinel Security Assessment — Western Europe*, December 14, 2007, online at [http://www.janes.com].

[122] Nick Cook, "Tanker PFI is a Pathfinder for Procurement," *Jane's International Defence Review*, January, 1, 2003, online at [http://www.janes.com].

[123] H.Rept. 110-477, Section 1081, Conference Report to Accompany H.R. 1585, pp. 335-336.

[124] "Filler' Up," *Defense Daily*, February 19, 2008, Volume 237, Issue 32.

Appendix A: KC-X Legislative Funding Background

FY2007

The Administration's KC-X request was for $36 million for advanced procurement funding and nearly $204 million for research, development, test, and evaluation (RDT&E). However, authorizers denied the requested procurement funding and cut RDT&E funding to $152 million.[125] Appropriators provided at total of $70 million in funding stating, "the amount provided in the conference agreement was identified in writing by the Department of Defense as the level needed to meet all fiscal year 2007 requirements."[126]

FY2008

The Administration requested $314 million for KC-X RDT&E, which authorizers fully supported.[127] Appropriators, as in FY2007, provided $114 million for RDT&E.[128] Additionally, appropriators provided $150 million into a "Tanker Replacement Transfer Fund" thereby providing the Air Force latitude to use the funds as needed in procurement, operations and maintenance, and/or RDT&E as needed to support KC-X acquisition.[129]

FY2009

The Administration's KC-X request for FY2009 includes $62 million in advanced procurement funding for five aircraft expected to be procured in FY2010 and delivered in 2012.[130] Additionally, the Administration requested $832 million for RDT&E funding to support system development and demonstration.[131]

---

[125] H.Rept. 109-702, Conference Report to Accompany H.R. 5122.

[126] H.Rept. 109-676, Conference Report to Accompany H.R. 5631, p. 315.

[127] H.Rept. 110-477, Conference Report to Accompany H.R. 1585, p. 797.

[128] H.Rept. 110-434, Conference Report to Accompany H.R. 3222, pp. 308.

[129] Ibid, Section 8112, p. 46.

[130] "Aircraft Procurement, Air Force, Volume 1," *USAF Committee Staff Procurement Backup Book, FY2009 Budget Estimates*, February 2008, pp. 2-33.

[131] "Research, Development, Test and Evaluation (RDT&E), Descriptive Summaries, Volume 2, Budget Activities 4-6," *Department of the Air Force FY2009 Budget Estimates*, February 2008, p. 987.

Appendix B: Previous Issues for Congress

There have been issues of significant interest to earlier sessions of Congress involving the recapitalization of the KC-135 fleet. One issue involved the controversy that surrounded earlier DOD attempts to replace some KC-135s using a proposed lease program. A second issue that now appears to be resolved is the timing of recapitalization.

Modernization Controversy

Modernizing or replacing the Air Force tanker fleet has been a point of contention for more than a decade. In 1996, the General Accounting Office (GAO) asserted that the long-term viability of the KC-135 fleet was questionable and advocated expeditiously studying replacement options. DOD countered that KC-135 airframe hours were low and that the Air Force could sustain the fleet for another 35 years.[132] In 2001, the Air Force reported that the KC-135 fleet would incur "significant cost increases" between 2001 and 2040, but "no economic crisis is on the horizon...there appears to be no run-away cost-growth," and "the fleet is structurally viable to 2040."[133] At that time, the Air Force position on tanker modernization was to conduct an analysis of alternatives (AOA) to determine the optimal replacement option for KC-135s. It would begin recapitalization in the 2012 time frame to meet KC-135 retirement by 2040 when the Air Force expects the KC-135 to reach the end of its service life.

Section 8159 of the FY2002 National Defense Appropriations Act (P.L. 107-117) authorized the Air Force to lease 100 Boeing KC-767 aircraft to replace some of the oldest and least capable KC-135s — the "E-models." This proposal proved controversial because section 8159 appeared to depart from traditional acquisition processes and weaken congressional oversight. The Government Accountability Office also concluded that a lease would cost more than procuring the aircraft.[134] Further, many found Air Force arguments in favor of the lease to contradict its position of just a year prior. Congress debated the proposed lease four hearings, culminating with a pair of Senate hearings in September 2003.[135] Subsequently, alleged and admitted ethical violations by government and industry representatives involved in the lease proposal added to the controversy.

The FY2004 Defense Authorization Act (P.L. 108-136, Sec.135) forged a compromise between opponents and proponents of the KC-767 by giving the Air Force permission to lease 20 tanker aircraft and purchase an additional 80 aircraft. Section 134 of this act prohibited the Air Force from retiring in FY2004 more than 12 KC-135Es. In September 2004, the Air Force announced it had grounded 29 KC-

---

[132] GAO/NSIAD-96-160.

[133] "KC-135 Economic Service Life Study," Technical Report F34601-96-C-0111, February 9, 2001.

[134] Neil P. Curtan, *Military Aircraft: Observations on the Proposed Lease of Aerial Refueling Aircraft by the Air Force*, GAO-03-1143T, Washington, D.C., September 3, 2003.

[135] See CRS Report RL32056, *The Air Force KC-767 Tanker Lease Proposal*.

135Es due to safety concerns. Conferees also mandated that the Air Force conduct an air refueling AOA and that an independent assessment be conducted on the condition of the KC-135E fleet.

On February 1, 2004, former Deputy Secretary of Defense Paul Wolfowitz requested that the Defense Science Board (DSB) conduct the independent analysis of the KC-135E fleet, and on February 24, 2004, former acting Undersecretary of Defense for Acquisition Michael Wynne directed the Air Force to conduct an aerial refueling AOA. Although it had the statutory authority to proceed, DOD did not request any funds for FY2005 to lease 20 aircraft or procure 80 aircraft. Defense Department leaders instead deferred executing either action until the completion of the DSB report, and an internal investigation by the DOD Inspector General (IG) on potential improprieties by Boeing Company executives and whether these activities negatively effected the tanker lease program.

On April 20, 2004, Darleen A. Druyan, the former lead Air Force negotiator on the tanker lease program, pleaded guilty to one charge of criminal conspiracy. Ms. Druyan admitted to secretly negotiating an executive job with the Boeing company while still overseeing the $23 billion deal between the Air Force and Boeing.[136] Lease supporters argued that Ms. Druyan was a single "bad apple" and that her actions did not negate the KC-767's merits. Reportedly In February 2005, however, the DOD IG found that Air Force Secretary James Roche misused his office when he lobbied the Office of Management and Budget (OMB) to support the lease concept.[137] The IG's final report found that four other senior DOD officials were guilty of evading OMB and DOD acquisition regulations that are designed to demonstrate best business practices and to provide accountability. The DOD IG found that senior DOD officials knowingly misrepresented the state of the KC-135 fleet and air refueling requirements.[138]

When Does Recapitalization Need to Start?

Rand's AOA concluded that the timing of recapitalization did not affect the overall life-cycle costs if "the AOA-guidance fleet meets the tanker requirement."[139] Therefore, the AOA concluded, the timing of KC-135 recapitalization should be based on factors other than costs. The AOA argued that three considerations favored earlier replacement of the KC-135:[140]

- Technical risk of continuing to operate the KC-135 fleet. The AOA found "considerable uncertainty about the future technical condition

---

[136] R. Merle, "Ex-Pentagon Official Admits Job Deal," *Washington Post*, April 21, 2004.

[137] R. Jeffrey Smith, "Roche Cited for 2 Ethics Violations," *Washington Post*, February 10, 2005.

[138] *Management Accountability Review of the Boeing KC-767A Tanker Program*, Office of the Inspector General of the Department of Defense, OIG-2004-171, May 13, 2005.

[139] Ibid, p. 14.

[140] Ibid.

and sustainment costs of the KC-135" ... and that "an early replacement program would be a hedging strategy against that uncertainty."[141]

- The existence of a constraint in how much of DOD's annual budget that is available for tanker recapitalization would favor earlier programs that allow replacement funds to be spread over a longer timeframe.
- A new tanker with increased capabilities that would "increase the flexibility and military utility of the tanker fleet."[142] The current KC-135 fleet largely lacks available features such as receiver in-flight refueling, the ability to refuel probe/drogue and boom receivers on the same mission, dual wing mounted pods for simultaneously refueling two probe/drogue receivers, and defensive systems.[143]

Additionally, Rand's AOA identified two considerations that favored deferring recapitalization. First, changes in the future geopolitical situation may result in DOD needing a smaller tanker fleet or one composed of significantly different capabilities from current air refueling capabilities. Second, near-term budget constraints may argue for temporarily deferring the start of KC-135 recapitalization.[144] Likewise, the Defense Science Board (DSB) task force also drew conclusions on the timing of recapitalization. While the DSB did not find a need for immediate recapitalization in their 2004 study, the task force concluded,

> "There is a recapitalization challenge that cannot be deferred indefinitely. There are risks in continuing to delay recapitalization. Even if tanker replacement at a rate of 15 per year began now, there will be 80-year-old KC-135 aircraft in the fleet awaiting replacement if the entire KC-135 fleet is to be replaced by a like number of similar capacity aircraft."[145]

---

[141] Ibid.

[142] Ibid, p. 15.

[143] Ibid, pp. 14-15.

[144] Ibid, p. 15.

[145] *Defense Science Board Task Force Report on Aerial Refueling Requirements*, May 2004, p. vi.

Appendix C: KC-135R System Description

Power plant:	Four CFM International CFM-56 turbofans
Wingspan:	130 feet, 10 inches
Length:	136 feet, 3 inches
Height:	41 feet, 8 inches
Passengers	54
Cargo Pallets	6
Maximum Fuel Capacity	200,000 pounds

Source: USAF Fact Sheet, KC-135 Stratotanker, online at [http://www.af.mil/factsheets/factsheet.asp?id=110] and *The Air Force Handbook: 2007*.

Figure 4. KC-135 Refueling Air Force Fighters

Source: USAF photo by SSgt Suzanne Day.

Appendix D: KC-10 System Description

Power plant:	Three General Electric CF6-50C2 turbofans
Wingspan:	165 feet, 4.5 inches
Length:	181 feet, 7 inches
Height:	58 feet, 1 inch
Passengers	75
Cargo Pallets	27
Maximum Fuel Capacity	356,000 pounds

Source: USAF Fact Sheet, KC-10 Extender, September, 2006, online at [http://www.af.mil/factsheets/factsheet.asp?id=109].

Figure 5. KC-10 Refueling Air Force Fighters

Source: USAF photo.

Appendix E: KC-767 System Description

Wingspan:	156 feet, 1 inch
Length:	159 feet, 2 inches
Height:	52 feet
Passengers	190
Cargo Pallets	19
Patients	97 for aeromedical evacuation
Maximum Fuel Capacity	more than 200,000 pounds

Source: The Boeing Company online at [http://www.boeing.com/ids/globaltanker/usaf/KC_767/specs.html].

Figure 6. Artist Impression of KC-767

Source: Jane's All The World's Aircraft at [http://www.janes.com].

Appendix F: KC-30 System Description

Wingspan:	197 feet, 10 inches
Length:	192 feet, 11 inches
Height:	57 feet, 1 inch
Passengers	226
Cargo Pallets	32
Patients	108 for aeromedical evacuation
Maximum Fuel Capacity	245,000 pounds

Source: Northrop Grumman, pamphlet, "KC-30 Tanker: Total Air Mobility."

Figure 7. Artist Impression of KC-30

Source: Jane's All The World's Aircraft at [http://www.janes.com