

# KC-X

## The Game Changer for Mobility

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The nation's airlift forces have been in high demand since the Gulf War of 1991. The tempo of operations has increased even more as the nation responded to a wide variety of military campaigns and contingencies—from Afghanistan to Iraq to numerous disaster-relief and humanitarian crises. The fact that one Air Force tanker or transport aircraft takes off or lands every 90 seconds gives us some idea of the pace of air-mobility operations.<sup>1</sup>

The nation's 172 C-17s represent the backbone of its air-mobility fleet, which enables global response. These aircraft have proven fundamental to US engagement, from deploying forces immediately after the terrorist attacks of 11 September 2001 to delivering relief aid after the earthquake in Pakistan and tsunami in Indonesia. The C-17 is well suited to this role, carrying 18 pallets of cargo—more than 170,000 pounds of material or 102 soldiers—up to 2,400 miles without refueling.<sup>2</sup>

The extraordinary performance of the C-17 comes with a cost. The Air Force planned for each aircraft to have a 30-year life span, flying 1,000 hours per year. The pace of current operations, however, requires these aircraft to log 1,500 to 1,800 hours a year, prompting Gen Arthur Lichte, commander of Air Mobility Command, to observe that “we know we’re going so fast that . . . instead of a 30-year life, [the C-17] is only going to [have] a 25-year life, or 22.”<sup>3</sup>

The rate of operations has serious implications for the nation and the Air Force's ability to provide an assured aerial response

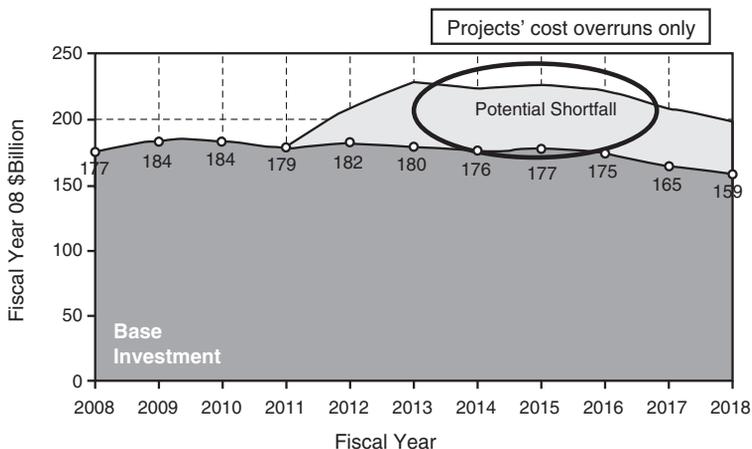
worldwide. By flying more hours per year, the Air Force will have to recapitalize the airlift force sooner than planned. Given the number of critical programs currently in the service's acquisition cue—tanker, combat rescue, space awareness, F-35, and bomber—adding airlift aircraft to the list sooner than expected will strain acquisition and operations/maintenance funds even more. The Congressional Budget Office forecasts that the existing Department of Defense (DOD) budget is \$300 billion short (see figure) over the Future Years Defense Plan as the services attempt to recapitalize following extended combat operations in the Middle East.<sup>4</sup> Defense analyst Loren Thompson declares that “the Air Force's future mobility assets are unlikely to be adequate to satisfy the needs of the joint force for airlift.”<sup>5</sup>

Two options for overcoming this dilemma have emerged. First, according to General Lichte, “If we want to slow down the use of the airplanes . . . we'd think about putting them in the Guard and Reserve.” C-17s in the Reserve forces would fly fewer hours each year because those units do not operate at the same tempo as active duty squadrons.<sup>6</sup>

Alternatively, the Air Force could purchase more of these airlifters. Since the current fleet of 172 C-17s is flying at least one-third more hours than planned, increasing the size of the fleet by about one-third (to at least 231 aircraft) would balance the workload.<sup>7</sup> The planned C-17 program will provide the Air Force with a total of 205 C-17s,

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**Figure. Potential DOD \$300 billion shortfall to fully fund recapitalization.** (From Hugh Brady, “Macroeconomic and Defense Topline Forecast: 44th Annual GEIA Federal Forecast” [presentation at the Government Electronics and Information Technology Association 2008 Vision Conference, Washington, DC, 16–17 October 2008].)

so the service needs at least 26 more. Costing \$250 million per aircraft, the additional C-17s would require another \$6.5 billion in Air Force spending.

Is there another option other than flying less or buying more? Indeed, the Air Force’s next-generation aerial-refueling tanker—the KC-X—offers an opportunity to reduce the C-17’s workload. Historically, the Air Force has used tanker aircraft almost exclusively for aerial-refueling operations. Some individuals in the air-refueling business suggest that tankers offer little promise as airlifters, citing the fact that, for various reasons, tankers have carried less than 1 percent of the cargo transported.<sup>8</sup> Specifically, the Cochran loader, the mainstay for loading/off-loading a KC-10, was not available worldwide in large numbers, and, if deployed to dispersed airfields, it required several hours to reassemble. Furthermore, the KC-135’s floors could support only six very light-weight cargo pallets. In addition, the 25,000- or 40,000-pound loaders needed for the KC-135 were not widely available. These factors combined to reduce opportunities for using tankers in a transport mode.

US military doctrine, however, calls for “all USAF tanker aircraft . . . to augment

core airlift assets.”<sup>9</sup> For example, while redeploying forces after Operation Desert Storm in 1991, KC-10 and KC-135 aircraft conducted more than 2,800 airlift sorties in addition to air-refueling missions.<sup>10</sup> To improve the tanker’s potential even further, the Air Force has fielded the Halvorsen and Tunner cargo loaders, thereby making it easier to support the entire mobility fleet, including air-refueling aircraft that carry cargo. Thus, the service recognizes the need to draw upon tanker aircraft to provide a wider range of capability. Indeed, as a means of attaining seamless integration with the entire defense transportation network, the KC-X is expected to accommodate the Halvorsen and Tunner loaders that will load or off-load its pallets.

Air Force leaders are searching along these lines for innovative approaches to reduce the high demands on the C-17 fleet. Gen Norton Schwartz, chief of staff of the Air Force, identified the KC-X as an aircraft that will and must break through barriers between the traditional airlift and air-refueling missions: “I am looking for versatility; single-mission aircraft don’t give that.”<sup>11</sup>

Recognizing this expectation, the prime contenders for the Air Force’s next-generation

tanker offered improved airlift capacity as part of their proposals. Boeing's KC-767 Advanced Tanker transports 190 passengers and 19 pallets of bulk cargo while Northrop Grumman's KC-45 delivers 226 passengers and 32 pallets. Compared to the KC-135's capacity of about 50 people and just six pallets, the new tankers' accommodations offer dramatic improvement for future airlift operations.

Capitalizing on the KC-X's capability requires more than just new aircraft—air-mobility operations must embrace a fresh mind-set to exploit the increased capacity, no matter which aircraft the Air Force selects. Air Force leaders seek to instill a new culture within Air Mobility Command—a culture that eliminates concepts of “tanker” or “transport” aircraft and adopts “mobility” aircraft that offer the war fighter versatility, flexibility, and reduced costs for mission accomplishment. The KC-10 inspired this thought process but does not exist in sufficient numbers to drive the change.

The next-generation tanker promises to further break down barriers between the airlift and air-refueling communities and reinforce the mobility mind-set. Military officials can draw upon the KC-X's airlift capacity and task it solely to transport passengers, cargo, or both, as mission requirements dictate. Although designed for over- and outsized cargo, currently the C-17 carries bulk loads on over 50 percent of its missions—those that the KC-X will be well suited to perform.<sup>12</sup> As a commercial derivative, KC-X aircraft will build on the airline industry's standard for cargo doors and floors, making them readily adaptable to transport cargo. The new aircraft will fit easily into the defense transportation system, improving the speed and accuracy with which US Transportation Command delivers services and products around the world. Much like the C-17, the KC-X will have defensive systems that allow for direct delivery to combat theaters and will not require cross-loading of materials at intermediate locations. As a result, the KC-X should fulfill what some have said is the ability to do “air refueling by night and airlift / aeromedical evacuation by day.”

This value becomes apparent in a number of scenarios when one views the KC-X as a mobility platform. For example, at present the Air Force would have to use 60 C-17s to transport a combat brigade of 3,000 soldiers and 540 pallets of bulk cargo from the United States to Iraq. In contrast, the KC-767 could perform the task with 45 aircraft, and the KC-45 would require just 30—half the number of C-17 sorties.

Much like today's tankers, the KC-X will carry out dual-role taskings, performing both air-refueling and airlift functions on the same mission. This profile applies during the deployment of fighter aircraft overseas, allowing the aircraft and their support equipment to arrive simultaneously. The deployment of squadrons to the Middle East as part of the nation's response to an unanticipated crisis illustrates one measure of the efficiency of dual-role tanker-transport aircraft. Specifically, the Air Force currently would need 72 KC-135s and 18 C-17s—a total of 90 mobility aircraft—to deploy a typical fighter squadron.<sup>13</sup> However, using the KC-45 in a multimission mode reduces the numbers to only 29 tanker sorties and 10 KC-45 mobility sorties—less than half the number of aircraft and one-third less fuel. The KC-767 would require fewer sorties as well: 36 tanker and 17 transport.<sup>14</sup>

Finally, when the Air Force supports the joint force during theater operations overseas, the versatility of the KC-X will offer innovative solutions, performing tanker and transport tasks in a single crew-duty day. Currently, the KC-135 flies from a rear base to refuel aircraft over Iraq or Afghanistan and then returns to its base empty. At the same time, C-17 or C-130 aircraft launch from the rear area to move cargo, passengers, and medical-evacuation patients forward and back in-theater. Outfitted with a self-defense suite, a KC-X aircraft could perform its air-refueling mission and then land at a forward base to pick up cargo, passengers, or patients before returning to the rear area. Thus, one KC-X could do what currently requires a dedicated tanker and dedicated transport aircraft.

The KC-X offers an additional benefit. International partners Japan and Italy have purchased the KC-767, while Britain, Australia, Saudi Arabia, and the United Arab Emirates have bought the KC-45. This situation suggests that, in addition to supplementing coalition air-refueling missions, the KC-X could more easily enhance coalition airlift operations. For instance, at the time, the C-17 was the only aircraft available to move Georgian troops from Iraq back to Tbilisi, but in the future, additional nations could assist as well by contributing assets with identical platforms that are well known and integrated into the US transportation network. Anticipating such new concept-of-operations modes for the KC-X, Gen Duncan McNabb, commander of US Transportation Command, predicted that the “KC-X will do for the tanker force what the C-17 did for the airlift force”—that is, break through mental barriers that limit its full employment.<sup>15</sup>

Capitalizing on the KC-X aircraft’s versatility will change the game in terms of how the nation’s air-mobility forces are employed. Embracing such changes will require alterations in the KC-X’s operational organizations, possibly including adjustments to the squadron’s composition regarding personnel, training, and associated enabling elements. As the Air Force moves in this direction, it will see a blurring of the division between “tanker” and “transport” forces in a beneficial, meaningful manner that allows the service to employ its forces in a more tailored, flexible, agile, and intelligent way, and to operate them more cost efficiently.

The Air Force will realize savings in two ways: cost per hour and total operation cost

(or depreciation). Designed for carrying oversized cargo and landing on dirt strips, C-17s operate at a relatively high cost per hour—\$21,800—while the KC-45 and KC-767 do so at less than half that amount.<sup>16</sup> Moreover, to these figures one must add aircraft depreciation costs, normally calculated by dividing the aircraft-procurement cost by the total number of hours to be flown. Thus, the C-17 depreciates at the rate of \$8,300 per hour while the KC-45, based on the commercial A330 (designed to fly for 100,000 hours), does so at \$1,500 per hour, and the KC-767 (designed to fly for 50,000 hours) at \$3,000. So total operating costs come to \$30,100 per hour for the C-17, \$12,500 for the KC-767, and \$11,000 for the KC-45 (see table for summary of savings realized by augmenting the C-17 fleet with the KC-X).<sup>17</sup> Clearly, either KC-X alternative will lower the Air Force’s operating costs.

Given the reality that the C-17 inventory is flying more than anticipated and that the KC-X will have exceptional potential to reduce the workload on the Globemaster, the time is right to embrace innovative concepts of operation and a fresh culture. Air Mobility Command seeks to operate this way today, but it does not have all the necessary resources. Integrating the KC-X as a mobility platform will permit more efficient use of C-17 and C-5 aircraft for outsized cargo. Options exist beyond the traditional programmatic approaches of redistributing the C-17 force between active duty and Reserve units or buying more C-17s. In an era when defense dollars need to deliver the most value, the Air Force needs the versatile KC-X now since it offers the service the

**Table. Cost per hour per cargo pallet**

	C-17	KC-767	KC-45
Operations and sustainment	\$21,800	\$9,500	\$9,500
Depreciation	\$8,300	\$3,000	\$1,500
Total	\$30,100	\$12,500	\$11,000
Number of pallets	18	19	32
Cost per hour per pallet	\$1,672	\$658	\$344

opportunity to operate faster, with greater flexibility and reduced costs, enabling the existing force to carry out its mission more safely and securely. The Air Force can enjoy these benefits, however, only by seeking alternatives and solutions outside the previ-

ous paradigms and by embracing a new culture. As a result, the service will field a true air-mobility force—and will assure the nation of a global response when and where it needs it. ✪

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## Notes

1. Headquarters Air Mobility Command, "2008: A Year in Review" (Scott AFB, IL: Headquarters Air Mobility Command, 29 December 2008), slide 29, <http://www.amc.af.mil/shared/media/document/AFD-090122-020.pdf>. This slide indicates that, from 11 September 2001 to 29 December 2008, AMC aircraft have flown 1,171,560 sorties. That equals 2,343,120 takeoffs and landings. A total of 2,664 days (3,836,160 minutes) have elapsed between those two dates. That translates to 1.6 minutes between each takeoff or landing. The various commanders of Air Mobility Command routinely remark in public that one of their aircraft takes off or lands every 90 seconds.

2. "C-17 Globemaster III," fact sheet, *Air Force Link*, October 2008, <http://www.af.mil/factsheets/factsheet.asp?fsID=86>.

3. John A. Tirpak, "Airlift on Thin Ice," *Air Force Magazine* 91, no. 10 (October 2008): 32, <http://www.airforce-magazine.com/MagazineArchive/Pages/2008/October%202008/1008airlift.aspx>.

4. Hugh Brady, "Macroeconomic and Defense Topline Forecast: 44th Annual GEIA Federal Forecast" (presentation at the Government Electronics and Information Technology Association 2008 Vision Conference, Washington, DC, 16–17 October 2008).

5. Loren B. Thompson, "Decaying Air Power Reflects Larger Problem" (presentation at the Air Force Association Annual Conference, Lexington Institute, Arlington, VA, 16 September 2008), <http://lexingtoninstitute.org/1320.shtml>.

6. Tirpak, "Airlift on Thin Ice," 33.

7. The number 231 represents a purely mathematical estimate based on the current C-17 fleet's overflying program hours by one-third. Some aircraft are overflying their hours by as much as 50 percent, which would increase the number of additional C-17 aircraft required.

8. "Boeing KC-767 Tanker: Sized Right for the Fight," Boeing news release, 7 May 2008, [http://www.boeing.com/news/releases/2008/q2/080507a\\_nr.html](http://www.boeing.com/news/releases/2008/q2/080507a_nr.html).

9. Joint Publication 3-17, *Joint Doctrine and Joint Tactics, Techniques, and Procedures for Air Mobility Operations*, 14 August 2002 (incorporating change 1, 14 April 2006), V-2, <http://www.dtic.mil/doctrine/jpoperationsseriespubs.htm>.

10. *KC-X: The Next Mobility Platform: The Need for a Flexible Tanker*, Headquarters Air Mobility Command White Paper (Scott AFB, IL: Headquarters Air Mobility Command, February 2007), 2, <http://www.amc.af.mil/shared/media/document/AFD-070227-044.pdf>.

11. *Ibid.*

12. *Ibid.*, 5.

13. The size of a fighter-squadron deployment package to a bare-base operation in the Middle East draws on the author's interview with the commander of the 27th Fighter Squadron in fall 2006. The commander provided the number of pallets and tonnage required for an illustrative deployment.

14. Air Force Pamphlet (AFP) 10-1403, *Air Mobility Planning Factors*, 18 December 2003, 18. Calculations are based on an F-15C unit with a primary aircraft authorization of 24 deploying 6,500 nautical miles from Langley AFB, VA, to the Middle East with 314 pallets of cargo. According to AFP 10-1403, 24 F-15Cs require 36 KC-135Rs and 18 C-17s for pallet transport (which also require 36 KC-135Rs). KC-767 and KC-45 sorties are calculated on their maximum fuel-weight ratio of fuel to the KC-135R (202,000 and 245,000 versus 200,000, respectively). The calculations assume that the KC-767 and KC-45 in transport mode require no air-to-air refueling to complete the deployment of pallets. Readers with access to the Combined Mating and Ranging Planning System (CMARPS), the Air Force's mobility planning tool, will get lower overall results, but the ratios will be similar.

15. Gregg Rusbarsky, *KC-767 Advanced Tanker*, <http://www.boeing.com/ids/globaltanker/index.html> (accessed 19 February 2009).

16. Vincent King Jr., Public Affairs, Headquarters US Air Force, Pentagon, Washington, DC, interview by the author, 20 May 2009.

17. For C-17 aircraft cost, see "C-17 Globemaster III." (Note that the unit cost of \$202.3 million cited in the fact sheet is in FY 1998 dollars. Inflation has increased that amount to \$250 million.) Depreciation costs for the C-17 equal the aircraft purchase price divided by the total programmed flying hours (250,000,000 / 30,000). For KC-45 and KC-767 flying hours, see Airworthiness Limitations Items (ALI) document AI/SE-M4/95A.0089/97A330.

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