

Fueling a Superpower

Reprioritizing the US Air Refueling Fleet for Great-Power Conflict

MAJ CALEB EGLI, US AIR FORCE

Abstract

The US Air Force must retain the capacity to deploy bombers extensively into the Pacific to deter a potentially hostile People's Republic of China, despite the increasing threat of antiaccess/area denial measures hindering naval and conventional basing operations. Tankers play a crucial role in facilitating the operations of long-range bombers. Therefore, the Air Force should prioritize enhancing its air refueling fleet capability and capacity by garnering congressional support to transition entirely from the KC-135, procuring additional KC-46s, and expediting the acquisition of the next-generation tanker. Through analysis of unclassified sources and the Fiscal Year 24 National Defense Authorization Act, this article asserts that revitalizing the development and funding for the Air Force's aging air refueling fleet is imperative. Strengthening the US tanker fleet will guarantee a credible conventional strike deterrence capability over long distances, while also meeting the demands of joint force operation.

Our ability to project and sustain the force, the foundation of that is our air refueling capability. It makes us a global superpower.

—General Jacqueline D. Van Ovost
Commander, US Transportation Command

In 1986, US aircraft conducted strikes over Libya as part of Operation El Dorado Canyon, delivering a firm message to Mu'ammar Gadhafi in response to his regime's sponsorship of terrorism.¹ US Air Force KC-135 and KC-10 air refueling tankers played a crucial role in facilitating multiple refueling events with F-111s during a round-trip mission from the United Kingdom to target sites in Libya. This operation highlights the interconnected relationship between air refueling and long-range conventional strikes, which forms the foundation of the United States' credible deterrence strategy against distant threats. The

¹ Judy G. Endicott, "Raid on Libya: Operation Eldorado Canyon," in *Short of War: Major USAF Contingency Operations*, ed. A. Timothy Warnock (Maxwell AFB, AL: Air University Press, 2000), 145–55, <https://media.defense.gov/>; and Walter J. Boyne, "El Dorado Canyon," *Air Force Magazine*, March 1999, 60, <https://media.defense.gov/>.

2022 *National Defense Strategy* emphasizes the significance of “combat-credible forces” in achieving integrated deterrence against hostile actors.²

However, the credibility of this deterrence is being challenged in the Indo-Pacific region, where an increasingly assertive People’s Republic of China (PRC) seeks to neutralize such deterrence through an expansive antiaccess/area denial (A2/AD) network, compelling the United States to consider operating beyond the reach of enemy weapons. Conducting conventional strikes over extended distances in the Indo-Pacific necessitates superior technological capabilities, such as those possessed by stealth bombers, as well as sufficient fuel capacity, which relies on tanker support.

To ensure that long-range conventional strike capabilities remain viable, the Air Force should reallocate its investment toward enhancing the capability and capacity of its air refueling tankers, focusing on securing congressional support to transition from the KC-135 to the KC-46, acquiring additional KC-46s, and expediting the procurement of the next generation of tanker aircraft. Strengthening the US tanker fleet will uphold a credible deterrent posture through potent long-range strike capabilities while meeting the operational requirements of joint forces.

The backdrop for such deterrence is the increasingly aggressive posture of the PRC, necessitating solutions for projecting force over long distances. The People’s Liberation Army Rocket Force’s (PLARF) extensive missile arsenal and integrated sensor network extend its weapons engagement zone (WEZ) to a range of 3,000 km (1,620 nautical miles) for its primary antiship and land-attack missiles, effectively impeding force projection from US airfields or carrier strike groups without facing significant attrition.³

Moreover, the PLA Air Force’s (PLAAF) advanced fighter, the J-20, armed with the new PL-17 air-to-air missile, boasts a range of 1,500 km (684 nautical miles), which can be extended through PLAAF air refueling capabilities.⁴ Consequently, considering the PLA’s A2/AD threat, the deployment of bombers and tankers is likely to originate from outside the theater, where distance compounds operational challenges.

For instance, let’s examine the distances between Taiwan and the two major US regional bases beyond the PLA’s WEZ. Measuring from Taiwan Taoyuan

² 2022 *National Defense Strategy of the United States of America* (Washington, DC: Department of Defense, 27 October 2022), 1, <https://media.defense.gov/>.

³ Robert Haddick, *Fire on the Water: China, America, and the Future of the Pacific*, 2nd edition (Annapolis, MD: Naval Institute Press, 2022), 59.

⁴ Ryan Pickrell, “China’s Most Advanced Stealth Fighter May Now Be Able to Strike Targets at Greater Distances,” *Air Force Times*, 17 November 2018, <https://www.airforcetimes.com/>; and Parth Satam, “China Reveals ‘World’s Longest Air-To-Air Missile’; PL-17 Missile Spotted On PLAAF’s J-16 Fighter Jet,” *Eur-Asian Times* (blog), 4 December 2023, <https://www.eurasiantimes.com/>.

International Airport, it spans 4,404 nautical miles (nm) to Joint Base Pearl Harbor-Hickam, Hawai'i, and 3,449 nm to Diego Garcia Airbase in the Indian Ocean. The respective round-trip distances surpass the unrefueled ranges of the B-52 (7,652 nm), B-1 (6,478 nm), B-2, and B-21 (6,000 nm), without factoring in fuel costs associated with diversions to alternate airfields or weather conditions.⁵

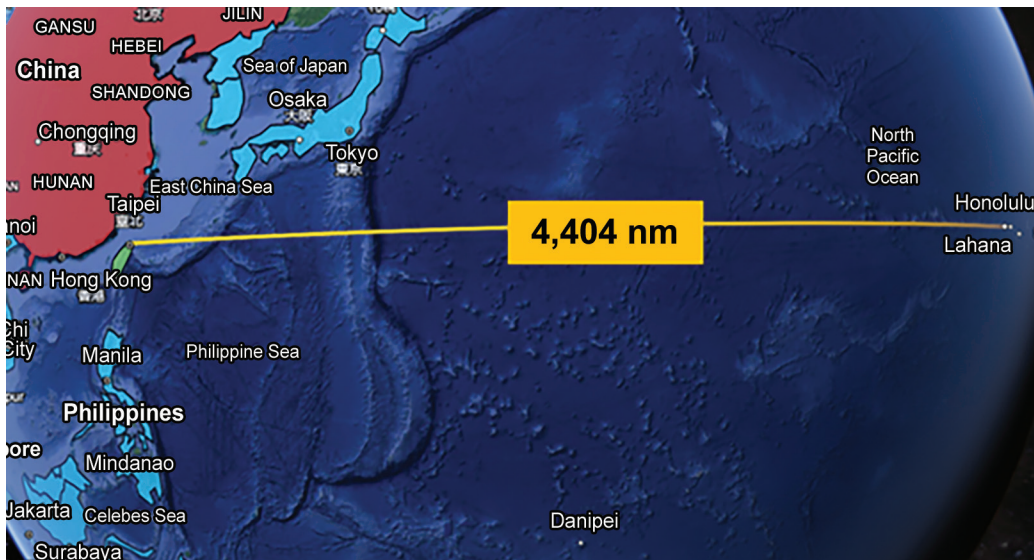


Figure 1. Distance from Honolulu to Taipei. (Created by the author using Google Earth with data from “Asia Outline with Countries,” *Cartography Vectors*, n.d., <https://cartographyvectors.com/>.)

Additionally, a direct route from Diego Garcia to Taipei traverses five different countries, including Chinese-controlled Hainan Island, necessitating a complex path to avoid potential threats, maintain operational secrecy, and comply with diplomatic protocols. These factors contribute to increased fuel consumption requirements.

The distance from the continental United States (CONUS) presents even greater challenges; the nominal one-way distance from Travis Air Force Base, California, to Taipei is 5,638 nm. Consequently, an effective conventional deterrent necessitates

⁵ The B-21’s nominal range is discussed in an open-source Australian policy report discussing whether to pursue purchasing the platform. Marcus Hellyer and Andrew Nicholls, “Impactful Projection: Long-Range Strike Options for Australia,” *Strategy*, December 2022, <https://ad-aspi.s3.ap-southeast-2.amazonaws.com/>; “B-21 Raider” (fact sheet, US Air Force, 2024), <https://www.af.mil/>; and “B-1B Lancer Archives,” *Air & Space Forces Magazine*, 2024, <https://www.airandspaceforces.com/>.

long-range strike capabilities to overcome the extensive A2/AD network of the PRC, underscoring the importance of a robust refueling fleet.

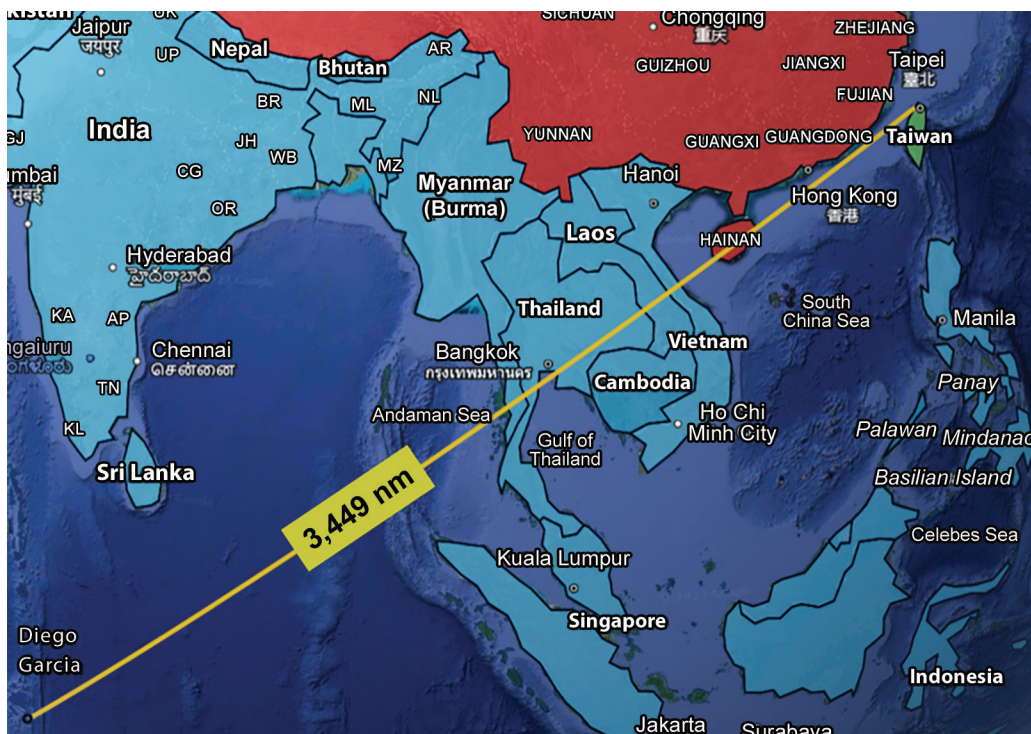


Figure 2. Distance from Diego Garcia to Taipei. (Created by the author using Google Earth with data from “Asia Outline with Countries,” *Cartography Vectors*, n.d., <https://cartographyvectors.com/>.)

Long-range stealth bombers represent one of the few viable options to penetrate the WEZ and engage targets effectively. Like the newly revealed B-21, stealth bombers possess air defense penetration capabilities that enable scalable precision strike operations at extended ranges. This capability has led strategists like Robert Haddick to assert, “Aircraft are the most effective predators of warships, and long-range bombers will rule the Indo-Pacific.”⁶

Moreover, Mark Conversino, Air University’s chief academic officer, contends, “A future El Dorado Canyon-style strike might require the use of air assets based in the United States, in the absence of permission from other nations to use their soil to launch a one-time raid against a rogue state or even to fly across

⁶ Haddick, *Fire on the Water*, 222.

their territory.”⁷ However, to fully utilize their stealth capabilities, bombers require the increased fuel capacity provided by the US tanker fleet to fulfill their designated *long-range* role.

In the Pacific theater, tankers play a vital role in providing the necessary fuel capacity for bombers. Air refueling serves as a force multiplier, enabling aircraft to extend their operational endurance beyond their unrefueled ranges. This capability is indispensable for global strike and mobility operations, particularly in the Indo-Pacific theater where it is essential for mission execution.⁸

When applied to the Indo-Pacific region, the term *crucial* underscores the indispensable nature of air refueling for mission success. In previous scenarios, tankers could refuel bombers before entering the WEZ on approach and just outside the WEZ on departure, ensuring they have the requisite fuel to accomplish their objectives. Additionally, the potential acquisition of a low-observable tanker could enable it to operate as a “stand-in” force, refueling bombers within the WEZ with reduced risk of detection and increased potential for maintaining operational surprise.

Hence, when Secretary of Defense Lloyd Austin highlighted that “bombers . . . would have the range to prosecute targets without the need for bases close to enemy territory,” it was implicitly understood that such operations would rely on air refueling support.⁹ Nonetheless, the Air Force’s existing tanker fleet faces specific challenges related to their capacity and capabilities.

The Air Force’s strategically vital air refueling fleet faces significant challenges in terms of both capacity and capabilities, particularly concerning its mobility tankers. With an average airframe age surpassing 60 years, the 396-aircraft fleet of venerable KC-135s was introduced into the Air Force inventory back in 1956.¹⁰ Escalating maintenance requirements, dwindling access to skilled personnel, and a decline in the availability of spare parts have escalated operational costs associated with the KC-135. A 2023 Government Accountability Office (GAO) report examining Air Force aircraft availability rates between 2011 and 2021 revealed that the KC-135 fleet failed to meet its objectives for 8 of those 11 years, while

⁷ Mark J. Conversino, “The Changed Nature of Strategic Air Attack,” *Parameters* 27, no. 4 (Winter 1997), 8, <https://doi.org/>.

⁸ Air Force Doctrine Publication 3-36: *Air Mobility Operations* (Maxwell AFB, AL: Curtis E. Lemay Center, 28 June 2019), 56, <https://www.doctrine.af.mil/>.

⁹ John A. Tirpak, “Kendall: Ratio of Fighters to Bombers May Shift Toward Bombers in the Future,” *Air & Space Forces Magazine*, 2 May 2023, <https://www.airandspaceforces.com/>.

¹⁰ “KC-135 Stratotanker” (fact sheet, US Air Force, 2024), <https://www.af.mil/>; and “Boeing KC-97L Stratofreighter” (fact sheet, National Museum of the United States Air Force, 2024), <https://www.nationalmuseum.af.mil/>.

operational expenses steadily rose since 2016.¹¹ Despite the tanker's advancing age, the critical need for net air refueling capacity compelled the Air Force to operate the KC-135 for two years with a degraded autopilot system, accepting heightened risks to pilot fatigue to mitigate risks to mission accomplishment.¹² In terms of capabilities, the KC-135 possesses a nascent tactical datalink for battlespace awareness and lacks defensive systems, hindering joint interoperability and rendering it vulnerable to threats like A2/AD.

The versatile KC-10 served as a temporary solution while the Air Force pursued various tanker acquisition initiatives, ultimately leading to the development of the KC-46. Although capable of carrying more cargo and fuel than the KC-135, the service never procured the KC-10 in sufficient quantities to justify its long-term sustainability. The Air Force is set to phase out the KC-10 fleet by September 2024, having already completed its final combat sortie.¹³

Despite encountering initial challenges during its introduction, the newest addition to the Air Force tanker fleet, the KC-46, represents a much-needed enhancement in both capacity and capabilities. The Air Force, cognizant of risks, accepted the KC-46 from Boeing with seven significant airframe deficiencies, which remain unresolved.¹⁴ While offering significantly improved cargo capacity compared to the KC-135, the KC-46's offload capacity, only marginally exceeding that of the KC-135, represents a functional decline in refueling capacity over time as newer fighter platforms exhibit increased fuel burn rates with successive generations, underscoring the need for a larger tanker fleet.¹⁵ The Air Force intends to acquire 179 KC-46s to meet a Title-10 designated end strength of 466 total tankers of all

¹¹ Diana Maurer et al., *Weapon System Sustainment Aircraft Mission Capable Goals Were Generally Not Met and Sustainment Costs Varied by Aircraft*, Report to Congressional Committees (Washington, DC: US Government Accountability Office, November 2022), 55–60, <https://www.gao.gov/>.

¹² Rachel S. Cohen, "KC-135 Tanker Autopilot Now Safer to Use in Flight, Air Force Says," *Air Force Times*, 21 September 2023, <https://www.airforcetimes.com/>.

¹³ Rachel S. Cohen, "KC-10 Tanker Flies Last Combat Mission as Retirement Looms," *Air Force Times*, 6 October 2023, <https://www.airforcetimes.com/>.

¹⁴ Greg Hadley, "KC-46 Update: Where Things Stand With Every Deficiency," *Air & Space Forces Magazine*, 7 August 2023, <https://www.airandspaceforces.com/>.

¹⁵ "KC-46A Pegasus" (fact sheet, US Air Force, 2024), <https://www.af.mil/>; and Air Force Pamphlet (AFPAM) 10-1403: *Air Mobility Planning Factors*, 24 October 2018, 17, Table 9, <https://static.e-publishing.af.mil/>.

variants.¹⁶ Despite ongoing maturation, the KC-46 boasts enhanced connectivity and battlespace awareness capabilities and is several decades newer than other tankers in the fleet, positioning it as the most viable tanker option in the short term as the Air Force explores future air refueling platforms.

Air Force leaders have expressed a commitment to enhancing air refueling tanker capacity and capabilities. In testimony to Congress, General Jacqueline D. Van Ovost emphasized the critical role of the air refueling fleet, describing it as “the backbone of rapid global mobility and is our most stressed capability,” and stating, “We must continue recapitalizing the KC-135s and KC-10s with KC-46s.”¹⁷ Secretary of the Air Force Frank Kendall has also voiced concerns about the current tanker fleet:

Of particular concern is the survivability of our tankers, which have to be far enough forward to refuel fighters close enough to the threat that they can operate effectively. . . . Our preliminary assessment is that this will mandate a more survivable tanker that is not a derivative of a commercial aircraft. As a result, we have begun the effort to define the concept for this new capability, which will be competitively procured. One possibility is a blended wing body design. We intend to conduct an Analysis of Alternatives for this new platform, named Next Generation Aerial Refueling System [*sic*] (NGAS), in 2024.¹⁸

The Air Force is currently planning to introduce the Next-Generation Air-Refueling System (NGAS) tanker by 2035, aiming for enhanced survivability in contested environments. This entails incorporating features such as low observability and

¹⁶ Greg Knepper and Peter W. Singer, “Short Legs Can’t Win Arms Races: Range Issues and New Threats to Aerial Refueling Put U.S. Strategy at Risk,” *War on the Rocks*, 20 May 2015, <https://warontherocks.com/>; “KC-46A Pegasus”; Brian Everstine, “Budget Cuts Legacy Tankers Despite KC-46 Delays,” *Air & Space Forces Magazine*, 10 February 2020, <https://www.airandspaceforces.com/>; Brian W. Everstine, “The Tanker Gap,” *Air & Space Forces Magazine*, 1 April 2020, <https://www.airandspaceforces.com/>; Stephen Losey, “US Air Force Reworks Tanker Modernization Plans, Slashes next Buy,” *Defense News*, 7 March 2023, <https://www.defensenews.com/>; Stephen Losey, “US Air Force Awards Boeing \$2.3B Contract for 15 More KC-46s,” *Defense News*, 30 January 2023, <https://www.defensenews.com/>; “10 USC 9062: Policy; Composition; Aircraft Authorization,” 21 March 2024, <https://uscode.house.gov/>.

¹⁷ David Vergun, “General Expresses Concerns Over Readiness in Sealift, Air Refueling,” *DOD News*, 27 April 2023, <https://www.defense.gov/>; and Committee on Armed Services, “Hearing to Receive Testimony on the Posture of United States European Command and United States Transportation Command in Review of the Defense Authorization Request for Fiscal Year 2024 and the Future Years Defense Program” (Washington, DC, 27 April 2023), 26, <https://www.armed-services.senate.gov/>.

¹⁸ “Kendall Outlines Clear Path for Modernizing Air, Space Forces & Confronting Peer Competition,” Air Force Public Affairs, 7 March 2023, <https://www.af.mil/>.

improved joint interoperability, which are crucial in an A2/AD scenario.¹⁹ There is even consideration for remote piloting capabilities, akin to the Navy's MQ-25 carrier-based air refueling drone, to minimize risks to human operators while maximizing fuel capacity.²⁰

However, translating desired capabilities into an operationally capable aircraft often presents significant challenges.²¹ While the Air Force's NGAS acquisition strategy is still under review, it is improbable that a commercially available solution could meet the stringent requirements of a next-generation tanker, potentially necessitating a costly and time-consuming design process from scratch.²² Given the Air Force's recent experiences with the KC-46 program, the goal of fielding an NGAS tanker by 2035 may be overly optimistic, particularly considering it comes eight years after the PLA's accelerated modernization goal set for 2027.²³

Despite key stakeholders advocating for increased capacity and capabilities, the current funding prioritization for air refueling development indicates a lack of urgency. Examining budget allocations reveals the low prioritization of air refueling procurement and research funding. In the Fiscal Year 2023 (FY23) National Defense Authorization Act (NDAA), no new funds were allocated for mobility tanker procurement or research efforts.²⁴ While air refueling received increased attention in the FY24 NDAA, including funding for 15 of the planned 179 KC-46s and some NGAS research, the overall procurement spending for airlift aircraft decreased. In contrast, the F-35 and B-21 programs received significant increases in research, development, training, and evaluation funding, while kinetic aircraft procurement saw a substantial rise.²⁵ Notably, the FY24 NDAA allocated USD 2.33 billion to Next Generation Air Dominance research compared to only

¹⁹ Stephen Losey, "US Air Force to Issue New Refueling Tanker Request in September," *Defense News*, 2 August 2023, <https://www.defensenews.com/>.

²⁰ "MQ-25TM Stingray" (fact sheet, NAVAIR, 2024), <https://www.navair.navy.mil/>.

²¹ Senior officer, interview by the author, 11 December 2023. Information obtained under conditions of nonattribution.

²² Losey, "US Air Force to Issue New Refueling Tanker Request."

²³ "The 14th Five-Year Plan for National Economic and Social Development of the People's Republic of China and the Outline of Long-Term Goals for 2035," Xinhuanet, 13 March 2021, <http://www.xinhuanet.com/>, translated by Google. See also Kyle Amonson and Dane Egli, "The Ambitious Dragon: Beijing's Calculus for Invading Taiwan by 2030," *Journal of Indo-Pacific Affairs* 6, no. 3 (March–April 2023): 37–53, <https://www.airuniversity.af.edu/>.

²⁴ "Summary of the Fiscal Year 2023 National Defense Authorization Act" (United States Senate Committee On Armed Services, 15 December 2022), 7, <https://www.armed-services.senate.gov/>.

²⁵ *Fiscal Year 2024 Budget Overview* (Washington, DC: Department of the Air Force, 2023), 19–25, <https://www.saffm.hq.af.mil/>.

USD 7.93 million for NGAS—nearly 300 times more for fighter development than air refueling.²⁶

Furthermore, Congress imposed restrictions on the procurement of additional KC-46s beyond the contracted number and mandated the retention of KC-135s until the Air Force provides validated needs and long-term cost estimates. This effectively freezes the configuration of the Air Force tanker fleet, potentially compromising operational capabilities if a plan to modernize the fleet is not convincingly presented to Congress.²⁷

Some observers may question the prioritization of air refueling funding over other pressing requirements. For example, planners could potentially mitigate the need for additional tankers by diversifying supply and force projection nodes, an effort Congress has allocated USD 8.9 billion toward since FY20, expanding and negotiating access to 66 basing sites.²⁸ If the USINDOPACOM theater were to escalate into open conflict, the immediate demand for fighter and bomber platforms, along with their associated support elements, might initially seem adequately met by the hundreds of tankers already in the Air Force fleet. Moreover, modifying existing tankers could offer a quicker alternative to enhancing battlespace awareness, as proposed by the Air Reserve Component A5/A8 regarding KC-135s, instead of investing in costly new tanker acquisitions.²⁹ Additionally, the Air Force could alleviate theater air refueling requirements by collaborating with allies, as demonstrated by Singaporean A330s refueling USAF B-1 bombers.³⁰ However, it is crucial to carefully consider the potentially escalatory implications of emphasizing a strategy centered on long-range bombers when evaluating partnerships with regional allies and partners. Thus, critics may view increased investment in air refueling as a misallocation of resources, particularly when kinetic solutions also require updates and programmatic research, and alternative approaches exist for addressing air refueling shortfalls.

²⁶ Senate, *National Defense Authorization Act for Fiscal Year 2024 Conference Report*, December 2023, 1794, <https://www.armed-services.senate.gov/>.

²⁷ House, *National Defense Authorization Act for Fiscal Year 2024*, 118th Cong., 1st sess., 2023, H.R. 2670, sections 141 & 145.

²⁸ Luke A. Nicastro, *U.S. Defense Infrastructure in the Indo-Pacific: Background and Issues for Congress* (Washington, DC: Congressional Research Service, 6 June 2023), 2, <https://crsreports.congress.gov/>.

²⁹ David Rodriguez, “The Air Reserve Component’s Impact on Modernizing Legacy Aircraft to Complete the Advanced Battle Management System: KC-135 RTIC and the Gladiator Pod” (master’s thesis, Air Force Institute of Technology, June 2021), 27, <https://apps.dtic.mil/>.

³⁰ “US B-1B Lancers Conduct Air-to-Air Refueling Training with Republic of Singapore Air Force,” Pacific Air Forces Public Affairs, 19 January 2024, <https://www.pacaf.af.mil/>.

Table 1. US Indo-Pacific Command allied and partner boom tankers

Country	Projected # of Tankers	Models
Japan	10	KC—46 (ordered), KC-767
Australia	7	KC-30A, A330
Singapore	6	A330
India	6*	TBD, desired in 2024
South Korea	4	A330
Indonesia	2*	TBD, planned by 2024
Total	35	

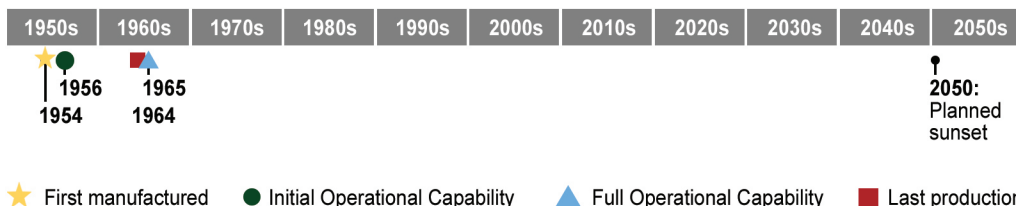
While acknowledging the validity of these arguments, investing in tankers will undoubtedly enhance theater logistical resilience and expand strategic options. As the Air Force presence becomes more dispersed across multiple bases, the demand for logistical “connectors” like tankers will inevitably increase to facilitate decentralized execution.³¹ Additionally, while a USD 2 million Air Battle Management System (ABMS) compatible upgrade may enhance the short-term capabilities of a single KC-135, allocating the remainder of the USD 800 million toward platforms inherently equipped with battlespace awareness, such as the KC-46, could yield greater long-term benefits.³² Transitioning to more capable systems sooner could also expedite the reallocation of approximately USD 3.7 billion per year, or USD 92 billion over the remaining lifespan of the KC-135, toward its maintenance and operation.³³

³¹ Chris Dougherty, *Buying Time: Logistics for a New American Way of War* (Washington, DC: Center for a New American Security, April 2023), 19, <https://s3.us-east-1.amazonaws.com/>.

³² Rodriguez, “The Air Reserve Component’s Impact,” 65; and Ryan Sutherland, “UTNG KC-135 Modernizing for the Future,” 155th Air Refueling Wing, 13 April 2021, <https://www.nationalguard.mil/>.

³³ Maurer et al., *Weapon System Sustainment Aircraft Mission Capable Goals*, 56.

KC-135 Life Cycle Timeline



KC-135 Sustainment Status

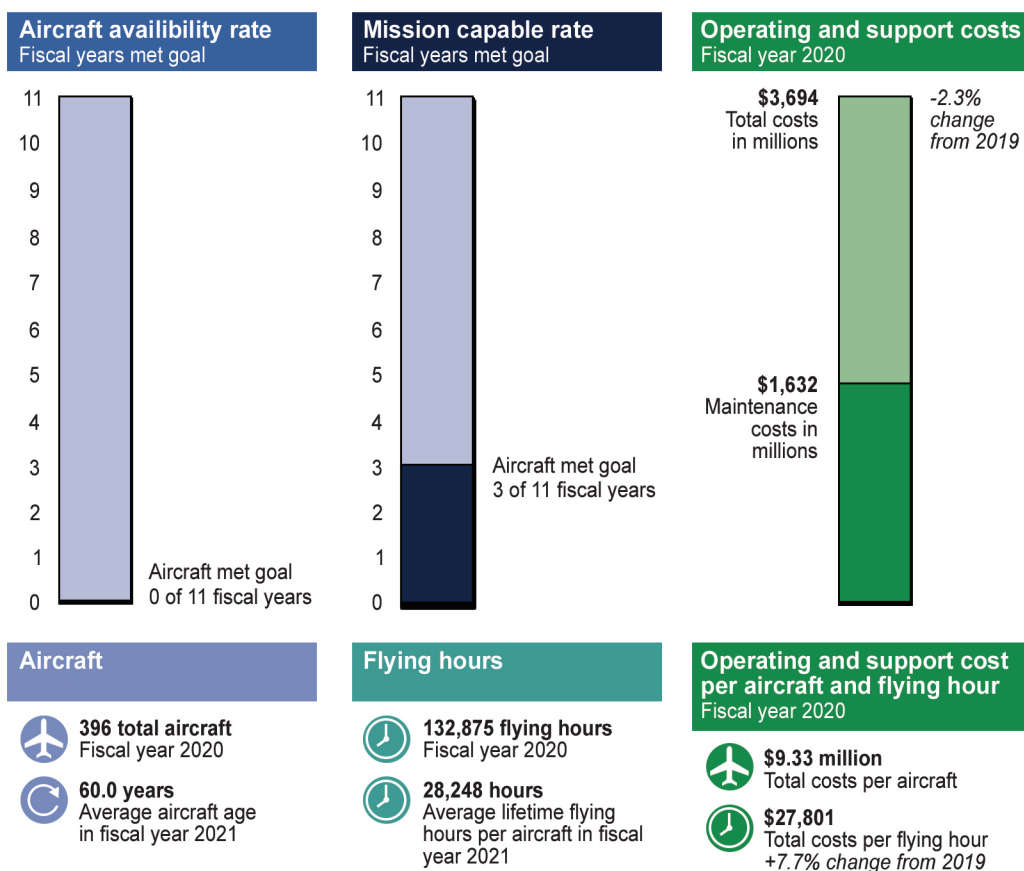


Figure 3. KC-135 GAO report breakout. (Source: *Weapon System Sustainment Aircraft Mission Capable Goals Were Generally Not Met and Sustainment Costs Varied by Aircraft*, Report to Congressional Committees (Washington, DC: Government Accountability Office, November 2022), 56 <https://www.gao.gov/>.)

Considering the utilization of regional air refueling support, while highly skilled and integrated regional allies and partners possess compatible air refueling aircraft, their combined capacity would equate to roughly three USAF tanker squadrons at best. While this support is beneficial, it may not be decisive, particularly given the uncertainty surrounding availability due to host nation operational requirements and political considerations.³⁴ Addressing the imperative to mitigate escalatory messaging with our partners is a crucial aspect of planning. Beyond the challenges posed by PLA A2/AD threats, the United States must carefully consider the inadvertent consequences of potentially making our allies and partners targets by association, particularly in the context of implementing a conventional deterrent strategy. An illustrative example of this occurred in February 2024 when, partly to avoid utilizing bombers from neighboring nations, the Air Force deployed B-1s from Dyess AFB, Texas for CONUS-to-CONUS missions to strike Iran-backed militia targets in Iraq and Syria. This approximately 12,400 nm round trip was made feasible by tanker support, akin to the role played by KC-135s out of RAF Mildenhall in the United Kingdom.³⁵ Therefore, to minimize the exposure of regional allies and conduct targeted information operations effectively, the Air Force may need to launch bombers from US territory to avoid potentially implicating regional allies and partners. This underscores the heightened necessity for tankers to serve as a critical bridge in facilitating such operations. This brings us to the final consideration: right-sizing the current tanker fleet.

Expanding the USAF air refueling fleet is imperative to ensure a robust long-range conventional deterrent while concurrently meeting joint force requirements, a necessity that would only intensify in the event of conflict. While limited access to classified posture statements, wargames, planning assumptions, and operations plans hinders a detailed analysis, it is feasible to approximate how many tankers would be available for worldwide contingency operations, providing a foundational basis for recommendations. Historical data points regarding inevitable expenses

³⁴ Chris Popcock, "Singapore Gets Smart with Airbus A330 Tanker," *Aviation International News*, 12 February 2020, <http://backend.ainonline.com/>; Amrita Nayak Dutta, "To Fill a Critical Gap, Indian Air Force Looks to Buy Six Mid-Air Refuellers," *Indian Express*, 30 August 2023, <https://indianexpress.com/>; "Japan Orders Two More Boeing KC-46A Tankers" (news release, Boeing, 29 November 2022), <https://boeing.mediaroom.com/>; Ridzwan Rahmat, "Indonesia Puts KC-46A Pegasus, Airbus A330 in Frame for Aerial Tanker Requirement," *Jane's Defence Weekly*, 18 January 2018, <https://archive.ph/>; "KC-30A Multi-Role Tanker Transport" (fact sheet, Royal Australian Air Force, 24 October 2022), <https://www.airforce.gov.au/>; and Jon Lake, "A330 MRTT Tanker Enters RoKAF Service," *Asian Military Review*, 21 February 2019, <https://www.asianmilitaryreview.com/>.

³⁵ Air Force Global Strike Command (@AFGlobalStrike), "Last Friday, five KC-135 Stratotankers from @RAFMildenhall refueled B-1 Lancers assigned to the @28thBombWing over the Atlantic in support of the airstrikes in Iraq and Syria against Iran's Islamic Revolutionary Guard Corps (IRGC) Quds Force and affiliated militia groups." X, 8 February 2024, 1:13pm, <https://twitter.com/>.

such as training, major maintenance, and homeland defense enable an estimation of the required force strength.

Tanker Force Availability Estimation

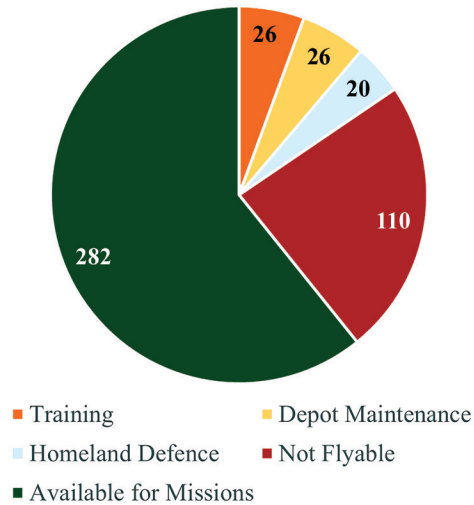


Figure 4. Representative estimation of tanker availability

Presently, there are 26 KC-135s and KC-46s stationed at the tanker schoolhouse at Altus AFB, Oklahoma, serving as a basis for training allocation.³⁶ Additionally, estimated data suggests that 26 tankers of both types would be simultaneously undergoing major maintenance, based on demonstrated KC-46 depot capacity combined with environmental planning data for the KC-135 depot.³⁷ Furthermore, an undisclosed number of tankers are on alert to support homeland defense fighters and command-and-control assets, with historical figures indicating a peak of 75 tankers post-9/11 and a steady state of eight in 2005.³⁸

Another notable instance reported having 20 tankers airborne several months following 9/11, serving as a plausible estimate for an escalated wartime homeland

³⁶ The author served as a KC-135 schoolhouse instructor from 2019 to 2023. The author would like to thank Mrs. Nicole Valence for her assistance in confirming this detail.

³⁷ *Environmental Assessment KC-46A Depot Maintenance Activation Tinker Air Force Base, Oklahoma Volume 1* (Tinker AFB, OK: 72nd Air Base Wing, 25 July 2014), Table 4-6 (<https://apps.dtic.mil/sti/pdfs/ADA607210.pdf>); and *KC-46A Tanker Modernization (KC-46A)*, Selected Acquisition Report (Fort Belvoir, VA: Defense Acquisition Visibility Environment, December 2022), 8, <https://www.esd.whs.mil/>.

³⁸ Mark J. Reents, "Operation Noble Eagle and the Use of Combat Air Patrols for Homeland Defense" (master's thesis, Naval Postgraduate School, Monterey, California, December 2008), 22–24, <https://apps.dtic.mil/>.

defense allocation.³⁹ Therefore, by rough approximation, a force consisting of 466 tankers could anticipate approximately 66 tails (16 percent) being allocated to training units, depot maintenance, and homeland defense. While these figures may vary, the essential requirement categories remain relatively consistent.

Even amid large-scale combat operations, the Air Force would continue to face the necessity of training new pilots and boom operators, conducting major maintenance, and safeguarding the homeland. Assessing the remaining tanker force, recent trends in mission capability rates indicate that slightly more than 71 percent would remain functional for missions.⁴⁰ Consequently, out of the 466 tankers, the Air Force could reasonably expect approximately 282 available (60 percent) for operations worldwide. This includes sustaining a long-range bomber air bridge in the Indo-Pacific, highlighting the multifaceted demands on air refueling assets.

When strategizing for a peer-to-peer conflict, the unavoidable attrition of forces would further diminish the available fleet. PLAAF doctrine, which prioritizes targeting high-value airborne assets like tankers in the initial stages of any conflict, could lead to debilitating effects on theater operations, as confirmed by high-level wargames.⁴¹ Consequently, the remaining tankers would need to fulfill the diverse demands of all combatant commanders worldwide while upholding a credible long-range bomber deterrent.

As recently as 2016, USTRANSCOM expressed uncertainty regarding the adequacy of tankers to fulfill their combined missions. The 2016 Mobility Capabilities and Requirements Study (MCRS) conducted by the Air Force analyzed three case studies involving varying degrees of simultaneous contingency operations and homeland defense events. In two of these scenarios, air refueling requirements surpassed existing capacity, reaching up to 120 percent of the air refueling fleet's strength, or 567 tankers of all types.⁴²

Although resourceful maintainers and innovative tanker planners can mitigate deficiencies to some extent, marginal efficiencies cannot fully compensate for systemic under-resourcing. General Van Ovost, testifying on the sufficiency of the current air refueling fleet, expressed doubts to Congress in 2023, stating, "Credible air refueling capacity must simultaneously cover multiple high-priority global

³⁹ Greg L. Davis, "Operation Noble Eagle," 17 November 2001, <https://www.af.mil/>.

⁴⁰ Rachel S. Cohen and Stephen Losey, "US Air Force Fleet's Mission-Capable Rates Are Stagnating. Here's the Plan to Change That," *Air Force Times*, 14 February 2022, <https://www.airforcetimes.com/>.

⁴¹ *PLA Aerospace Power: A Primer on Trends in China's Military Air, Space, and Missile Forces*, 3rd ed. (Maxwell AFB, AL: China Aerospace Studies Institute, 2022), 10, <https://www.airuniversity.af.edu/>; and Dougherty, "Buying Time," 10.

⁴² Carl Lude and Jean Mahan, "Mobility Capabilities and Requirements Study 2016: Executive Summary" (United States Transportation Command), n.d., <https://www.airandspaceforces.com/>.

demands, which causes daily and wartime concerns within the air refueling fleet . . . an inventory of 466 total aircraft [is] sufficient, but at elevated risk.”⁴³

Venturing into war with only 60 percent of a critically needed resource presents an undeniably elevated risk. In essence, the current investment falls short of aligning with the strategic value that Air Force tankers provide to the joint force, jeopardizing the ability to meet concurrent operational mission requirements.

To ensure the ability to employ long-range bombers in the Indo-Pacific while fulfilling joint force needs, the Air Force should prioritize enhancing its air refueling capacity and capabilities. It should advocate to Congress to lift the dual injunctions on retiring KC-135s and acquiring more KC-46s, thereby facilitating the revitalization of personnel, assets, and funding toward the newer and more capable KC-46. Congress has signaled receptiveness to a compelling argument by tasking the Air Force with justifying the business case for KC-135 recapitalization and outlining a clear road map for the NGAS tanker.⁴⁴

The Air Force should seize this opportunity and swiftly devise an accelerated plan, initially focusing on augmenting air refueling capacity (through increased KC-46 acquisition) and subsequently enhancing capabilities (expediting NGAS acquisition).⁴⁵ Leveraging the open KC-46 production line is crucial, as restarting similar lines—like those for the B-2, C-17, and F-22—would entail significant costs. If Congress deems 466 tankers the minimum necessary for global operations, it should direct the Air Force to bolster the force by 40 percent to 653 tankers to ensure readiness. Transitioning all tankers to KC-46s would require an additional 474 aircraft, amounting to approximately USD 89.6 billion. While a one-time procurement of this magnitude may be unlikely, the Air Force can gradually work toward this goal.

For instance, reallocating funds from less strategic investments, such as the refresh of “fourth-gen plus” F-15EXs, could substantially boost KC-46 procurement. Redirecting the USD 2.67 billion allocated for F-15EXs could nearly double the KC-46 procurement.⁴⁶ At USD 189 million per KC-46—or slightly

⁴³ General Jacqueline D. Van Ovost, “2023 Posture Statement to House Armed Services Committee Joint Subcommittee on Posture and Readiness of the Mobility Enterprise,” 28 March 2023, 16, <https://www.ustranscom.mil/>.

⁴⁴ House, *National Defense Authorization Act for Fiscal Year 2024*, 118th Cong., 1st sess., 2023, H.R. 2670, sections 139.

⁴⁵ John A. Tirpak, “B-21: Shape of the Future,” *Air & Space Forces Magazine*, 20 January 2023, <https://www.airandspaceforces.com/>.

⁴⁶ Frank Gorenc, “The Case for the F-15EX Fighter Jet,” *Las Vegas Sun*, 27 March 2019, <https://lasvegassun.com/>; and Senate, *National Defense Authorization Act for Fiscal Year 2024 Conference Report*, December 2023, Sec. 4001, 33 <https://www.armed-services.senate.gov/>.

less than the cost of two F-15EXs—the Air Force can continue to scale up its capabilities as it progresses toward the NGAS tanker.

Moreover, decisions and development for the NGAS tanker must accelerate to breakneck speed. This will entail making tough choices early in the process and implementing innovative acquisition strategies, such as decentralizing decision making and initiating early prototyping and testing, to expedite fielding times.⁴⁷ While these endeavors may not be straightforward or inexpensive, they represent crucial steps toward rejuvenating an air refueling fleet with the capacity and capabilities to provide crucial support for decision-makers, facilitating conventional long-range strikes as a deterrence while effectively meeting joint force requirements.

Nearly 30 years after Operation El Dorado Canyon, the United States conducted another mission in Libya, this time utilizing two B-2 stealth bombers. The mission proved to be tactically successful, neutralizing dozens of Islamic State fighters and decimating their training camps, thereby reaffirming America's readiness and capacity to execute lethal long-range strikes worldwide within hours.⁴⁸ The bombers, however, depended on the support of 15 KC-135s and KC-10s to complete their 34-hour round trip from Whiteman AFB, Missouri.⁴⁹ Few nations possess the capability to project such airpower globally. However, this capability is not assured, especially against adversaries equipped with significantly more robust A2/AD networks than Libya.

If the Air Force aims to uphold its commitment to providing “strategic deterrence, global strike, and combat support . . . anytime, anywhere,” it must possess a sufficiently resourced tanker fleet with the capacity and capability to facilitate long-range conventional strikes in the Indo-Pacific.⁵⁰ Among various legitimate requirements, air refueling stands out as a critically underfunded capability that urgently requires reevaluation to align with strategic objectives in the Indo-Pacific. As essential as they are, employing sophisticated long-range bombers without adequate tanker support to transport them, sustain them, and ensure their return poses significant challenges. ✪

⁴⁷ Jonathan P. Wong et al., *Improving Defense Acquisition: Insights from Three Decades of RAND Research* (Santa Monica: RAND Corporation, 2022), 30, <https://doi.org/>.

⁴⁸ Thomas Gibbons-Neff and Dan Lamothe, “The U.S. Flew Stealth Bombers across the Globe to Strike ISIS Camps in Libya,” *Washington Post*, 19 January 2017, <https://www.washingtonpost.com/>.

⁴⁹ The author served as a planner during the strike and was able to inform part of the tanker plan. Thomas J. Doscher, “AF Refuelers Enable B-2 Strike against ISIL in Libya,” 18th Air Force Public Affairs, 20 January 2017, <https://www.af.mil/>.

⁵⁰ “AFGSC Mission,” Air Force Global Strike Command, 2024, <https://www.afgsc.af.mil/>.

Maj Caleb Egli, US Air Force

Major Egli is a USAF senior pilot with more than 2,700 flying hours, 870 of which were in combat. He was most recently a KC-135 formal training unit evaluator pilot and Central Flight Instructor Course instructor at Altus AFB, Oklahoma. Presently, he is an Air Command and Staff College student at Maxwell AFB, Alabama.

Acknowledgments: The author expresses profound gratitude to Dr. Paul Springer, whose invaluable mentorship greatly contributed to this publication. The author is also deeply thankful for the insightful critiques provided by several individuals, including Maj Nicolas DelCore, Maj Colin Goepfert, Maj David Leibrand, Maj Alan Ortega, Maj Matthew Pineda, Maj Matthew Savage, Maj Patrick Skaife, Lt Col Kelsi Baker, Lt Col Charles Napier, Dr. Ann Mezzell, Col Blaine Baker, and Col Patrick Brady-Lee, as well as three anonymous reviewers. Any shortcomings identified remain the sole responsibility of the author.