

Department of the Air Force



Presentation

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Minding the Gap: How Operational Energy Can Help Us Address Logistics Challenges

Witness Statement of

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You will not find it difficult to prove that battles, campaigns, and even wars have been won or lost primarily because of logistics. - General Dwight D. Eisenhower

The National Defense Strategy, Joint Warfighting Concept, and Joint Concept for Contested Logistics highlight the criticality of resilient and agile logistics across the spectrum of conflict. The Air Force Operating Concept and Supporting Concept for Logistics Under Attack (LUA) further define the imperative of projecting, operating, and sustaining capabilities in contested environments. Our potential adversaries are posturing during daily enduring competition to constrain the logistics capabilities of the US and our allies, yet a credible logistics posture is a requisite element of integrated deterrence. Should deterrence fail, we expect a conflict with a near peer to involve determined multi-domain attacks on our basing and logistics enterprise. To compete, deter, and win against pacing adversaries, the Air Force must deliver and sustain persistent mission generation through more adaptive and resilient Airmen, equipment and basing.

Conducting logistics while under attack requires a combination of evolutionary and revolutionary change to our basing & logistics enterprise to be more adaptive to the operating environment. Successfully navigating contested logistics involves several imperatives: achieve and retain decision advantage by translating data into actionable, decision-quality information at the speed of relevance; set the theater in new ways to enable the rapid transition from competition to high-end conflict; reduce supply chain fragility while reducing logistics demands; deepen logistics interoperability with allies; and truly enable our Combat Support forces to maneuver for Agile Combat Employment. A separate and key aspect in achieving this vision of persistent mission generation within this decade will be operational energy considerations, which offer new opportunities and challenges to our infrastructure and forces.

Operational energy is one of many contributors to Air Force readiness; specifically, our ability to deliver air power to the warfighter when and where it is needed. As a critical enabler to our global mission, aviation fuel and energy to power aircraft comprised over 82% of the \$4.6 billion Air Force energy bill in 2020. That level of energy consumption becomes far more complicated in a contested environment. Due to the kinetic strike capabilities of our pacing adversaries, we must be prepared to disperse and maneuver our Air Force resources, commonly referred to as Agile Combat Employment (ACE). ACE is an Air Force solution to generate combat power from our vulnerable forward bases via rapid dispersal to a number of locations with smaller teams. ACE is necessary to maintain Airpower generation capability in the face of current and

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future threats. This scheme of maneuver allows us to survive and generate combat power from dispersed clusters of varied locations; it unavoidably complicates the logistics and sustainment solutions. ACE will likely require additional prepositioned assets and a more intricate distribution system to move materiel and supplies, to include energy.

Delivering and producing operational energy in contested environments is truly a Joint (and Combined) problem that requires a Joint (and Allied) solution. While we rely on the Joint Force and the Defense Logistics Agency (DLA) to sustain our energy and fuel supply lines, we are constantly seeking Air Force solutions to improve our operational energy efficiency especially given the logistical challenges of ACE. We are committed to improving fuel efficiency and reducing costs through leveraging alternative energy sources when it provides a competitive advantage and wherever practical. We continue to seek solutions to address aviation demand reduction, mission generation demand reduction, and installation demand reduction. We must reduce the materiel footprint needed to establish an operational foothold and generate combat missions, explore more energy efficient weapon systems and equipment, modernize our fuels support equipment to support ACE maneuvers in the INDOPACOM theater, and provide mobile, scalable power production systems that are lighter than legacy equipment. We believe there is synergy in advancing operational energy initiatives that not only result in efficiencies, they also enhance combat capability.

Air Force operational energy goals are to identify and deliver optimal operations planning and execution solutions for existing gaps, provide innovative energy solutions for new and legacy aircraft and systems, furnish energy-efficient weapons system sustainment analysis, and support the production of energy-informed war plans. Collaborative work within the Department of the Air Force involves numerous organizations that think creatively, experiment, innovate, procure, and ultimately field new solutions. This important and promising work is focused on ensuring we can supply operational energy in a survivable manner, reducing the demand for operational energy. In combination, these efforts aim to optimize the operational effectiveness of Airpower for Combatant Commanders.

Efforts to reduce operational energy demand are concentrated in three areas: reducing the footprint required for mission generation, reducing aviation and ground fuels demand, and reducing installation energy demands. We are exploring solutions that *reduce the footprint required for mission generation* in forward locations during dispersed operations. The **Fighter**

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Aircraft Adaptive Basing capability is a modified semi-truck designed to expedite logistics of rapid aircraft deployments. The trailer contains all the necessary components required to support power generation, hydraulic test stand, parts, and secure communications for pilot debriefs. It can be transported over the road or by aircraft and decreases our deployed footprint while supporting up to four F-15 aircraft with one trailer. As we look to modernize our fuels support equipment, the **VIPER Kit** takes existing Petroleum Oil and Lubricant (POL) components and configures them into a small custom sled that eliminates the need for R-11 refueling trucks during Hot Refuel Operations. In addition, it may be connected to host nation or commercial fuel assets, if available. It has an immediate impact on our energy footprint, decreasing processing times by 96% and distribution costs by 90% without decreasing our readiness or effectiveness in the fight. Lastly, the Air Force is testing two models of the **Agile Fueling System** that can receive and issue POL to either an aircraft or receiving point from a cargo aircraft utilizing onboard fuel bladders (A-Model); or receive and issue fuel from a fixed or mobile source to perform aircraft refueling from a position on the ground (G-Model). Units can be sling-loaded, air dropped and transported by all modes of air and surface.

The Air Force is exploring several capabilities that reduce demand on our operational energy needs by *reducing aviation fuel demand*. The Air Force is exploring six operational energy programs to enhance aircraft efficiency. These programs include legacy aircraft drag reduction, scheduling and software tools for more efficient utilization and loading of tanker and mobility aircraft, and engine sustainment programs that decrease fuel and maintenance requirements and increase engine time on wing. It is believed that these programs will make important strides to improve aviation fuel efficiency while also reducing forward aircraft fuel requirements in austere environments.

Finally, we are seeking solutions that *reduce installation energy demands*. The **Energy Efficient Environmental Control Unit (ECU)** demonstrated a 30% energy savings over the current ECUs within our Base Expeditionary Airfield Resources (BEAR) assets. A contract has been awarded and contractor validation testing is underway, with fielding estimated in FY22.

The **BEAR System for Load & Installation Management (BSLIM)** project developed a prototype capability to centrally manage the power grid and integrate renewable energy sources into the power grid. Testing and analysis continues on this effort. We are partnering with the Army, the DoD lead agency for tactical generator procurement, to purchase more **fuel efficient**

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generators, to include tactical micro-grids and hybrid generators, saving 10% of fuel requirements and reducing the footprint weight by 8%.

These capabilities have been informed by war games like the Long Duration Logistics Wargame, and exercises like Agile Flag, among others. We continue to experiment with our operational employments concepts, like ACE, to determine the optimal scheme of maneuver that will successfully prosecute a conflict with a peer adversary. As a result, we are learning new lessons that lend themselves to a wide range of materiel and non-materiel solutions, which when identified will also compete for future resourcing in our budget. It is heartening to see increased emphasis on logistics and sustainment in Service and Joint exercises, which further help us address challenges to the ACE logistical dilemmas by technologies that have the greatest impact to overall sustainment support, including reducing risk to fuel supply chains. Finally, we incorporated key energy principles throughout our Airmen's educational spectrum; an energy informed culture helps us understand the risk to mission and drives innovation to increase lethality.

Conclusion

Ultimately, the Air Force must be prepared to overcome determined multi-domain attack from pacing adversaries in order to generate Airpower and hold targets at risk, and operational energy is a key element. We have some answers, as outlined in this statement, and we know our continued experimentation, war games and exercises will reveal more opportunities to enhance our capabilities or reduce demand. We will continue to collaborate within the Air Force and among our Joint and DLA partners to share lessons learned, understand common gaps, and strive for common solutions where practical. Reducing our overall footprint, modernizing our weapons systems and support equipment will allow us to reduce our overall fuel demand and reliance on POL for tactical power production, as will potentially leveraging emerging renewable energy technologies to help generate and sustain airpower in contested environments. With the continued support of the Congress, the Air Force will be ready to compete, deter, and fight through logistics under attack.