2018 Annual Report

AIR FORCE OPERATIONAL ENERGY

Part One

Executive Summary

In a rapidly changing battlefront, energy availability and readiness have become increasingly vital to the Air Force mission to fly, fight, and *win*. At no other time, has the need for **operational energy (aviation fuel for the Air Force**) been so critical to our combat capability and global operations – yet rarely has optimizing aviation fuel use been prioritized in policy, budgetary decisions, acquisition processes, or operational planning.

Energy availability and **readiness** have become increasingly vital to the Air Force mission to **fly**, **fight**, and **win**.

As a result, the Air Force has at times experienced challenges in readiness and combat capability, such as increased maintenance issues, reduced engine life, and higher demands for fuel in theater. Service members are also more vulnerable when delivering fuel to troops when and where they need it.

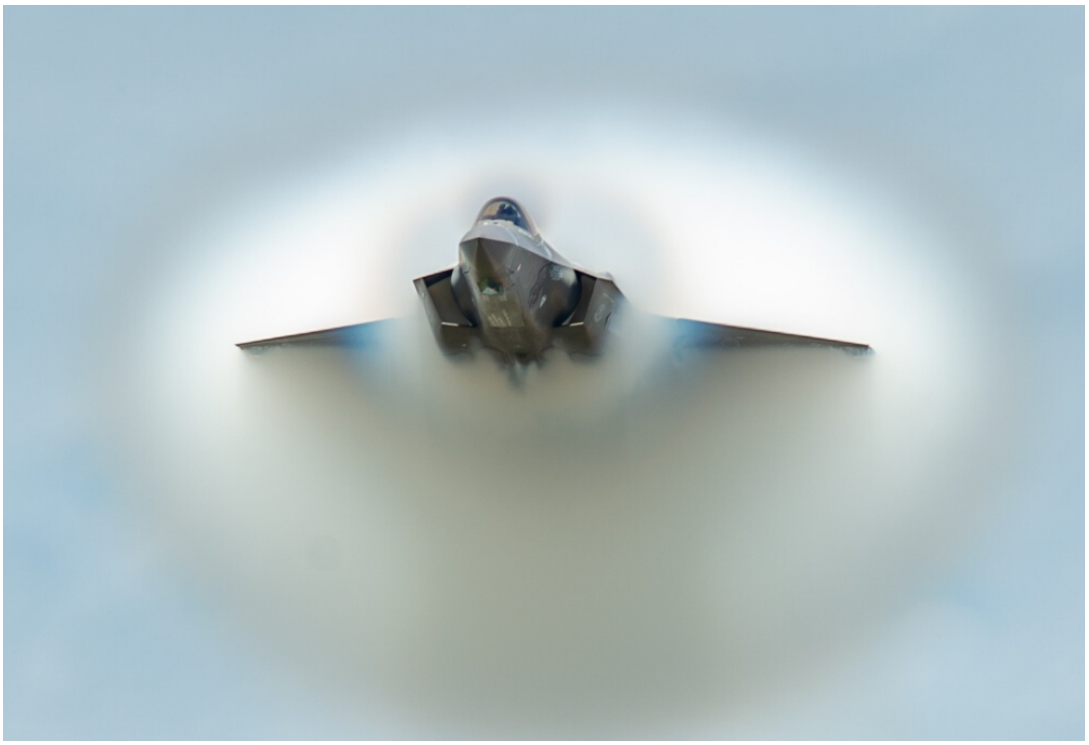
At **Air Force Operational Energy (SAF/IEN)**, we understand these complex challenges and are dedicated to providing **smarter energy solutions** for the warfighter through **modern technologies**, **data analysis**, **streamlined logistics** and **operations**, and **innovative processes**. Our team of subject matter experts work with Major Commands and aligned organizations to better recognize areas of opportunity for the Air Force. We continuously identify and champion optimization initiatives like aircraft drag and weight reduction, engine sustainment, improved fuel logistics through wargaming, and 21st century agile software for better mission planning.

Our Mission

To break barriers by connecting Airmen with technology, data, and innovative thinking to develop and champion energy-informed solutions for the Air Force.

Our Vision

To create an energy-optimized Air Force that maximizes combat capability for the warfighter.



In 2018 our office aligned its goals with the **U.S. National Defense Strategy** and **Air Force priorities**, and laid out a multi-faceted strategy to **increase combat capability** within the Air Force. Part One of this report provides a high-level overview of our goals and select initiatives, while Part Two includes a more in-depth discussion of all of our initiatives.

Our Goals

1. **Identify and deliver optimal operations planning and execution solutions for existing gaps**

2. **Provide innovative energy solutions for new and legacy aircraft and systems**

3. **Furnish energy-efficient weapons system sustainment analysis**

4. **Support the production of energy-informed war plans**

5. **Educate the Force and build the culture for operational energy**

Goal 1: Identify and deliver optimal operations planning and execution solutions for existing gaps

Central to our efforts to increase readiness and capability, we systematically look at Air Force flying operations, policies, and processes across all aircraft in the inventory to identify areas of improvement and determine best practices. In 2018, we made significant progress in this area with the following initiatives:

Established a fuel data collection strategy across the Force to pinpoint inefficiencies and analyze consumption trends

Comprehensive and reliable data collection and analysis is critical to understanding our operational risks and making informed decisions. Yet, at the end of 2017, only about **30 percent** of Air Force fuel use was captured in a sortie-level database, underscoring the lack of attention operational energy issues have previously received. To address this significant knowledge gap, in 2018 we completed the Operational Energy Data Collection Strategy to lay the foundation for collecting and storing aviation fuel use and associated mission execution data that is automated, high-resolution, and accurate. As fuel use records become more available and trustworthy, the Air Force can use data to inform mission operations, support a resilient Force, and protect its vulnerabilities.

Updated max range airspeed policy resulting in optimized operations

As a result of an optimization initiative led by our office, Air Combat Command enacted policy that directs 5th generation fighter aircraft to fly closer to maximum range airspeed during Coronet missions.

The faster speed decreases overall fuel consumption by about **6 percent**, and reduces costly flight hours by about **10 percent**. After a successful demonstration with **F-22 Raptors** at the end 2017, the office continued working with ACC and AMC in 2018 to formalize the procedures and expanded them to include the **F-35 Lightning II.**

Identified efficiency best practices for the C-17A fleet

In coordination with Air Mobility Command (AMC), our office completed a Line Operations Efficiency Analysis (LOEA) on the **C-17A Globemaster III** fleet, the largest consumer of aviation fuel in the DoD. We tasked a group of Air Force Reservists (with experience as commercial pilots) to interview Airmen at four C-17 bases from April to September 2018.

The pilots reviewed flight manuals, operational guidance materials, and local guidance, then surveyed crew members to understand energy efficiency techniques and mindsets, and solicited ideas from crew members and leaders. We published an official report, distributed to Air Force senior leaders at the end of 2018, outlining efficiency best practices for C-17 operations, operational fuel efficiency assessments, and recommendations on efficiency opportunities.

Goal 2: Provide innovative energy solutions for new and legacy aircraft and systems

We seek to optimize the Force through low or no-cost innovations that pay for themselves in readiness, fuel savings, and maintenance costs. By collaborating with organizations like Air Force Research Laboratory (AFRL) or Defense Innovation Unit (DIU), our office has a better understanding of what emerging technologies may help to increase combat capability through optimized fuel use. By playing an active role in the Air Force's capability development process, our office helps to incorporate smart operational energy solutions into its requirements and acquisition processes.

Introduced light-weight parts into operations to reduce aircraft weight

In 2018, we initiated a project to replace **C-17** winch cables with a lighter-weight alternative. This synthetic cable substitute is just as strong as the steel cable it is replacing and far easier to handle (reducing load time and workload), while also being safer for Airmen, as it will not recoil dangerously like the steel cable.

Our office also collaborated on an initiative to replace legacy aluminum honeycomb air inlets with a lightweight composite RAM Air Inlet system for the **C-5M Super Galaxy**. The new inlet is **19 percent** lighter and costs almost **$100,000 less** per part to manufacture. They have already transitioned to operational use, and will replace the aluminum parts on an attrition basis.

Goal 3: Furnish energy-efficient weapons system sustainment analysis

We aim to increase Air Force operational readiness through improved sustainment of legacy aircraft. Well-performing aircraft with fewer maintenance issues are not only safer, but use fuel more efficiently.

Engagement with defense and commercial aviation entities

In 2018, we engaged with multiple defense and commercial aviation entities to identify industry best practices and technologies in aircraft sustainment that could potentially translate to Air Force weapons systems and sustainment processes.

For example, we're contributing to the research and development of laser scanning of compressor blades, compressor blade coatings, and new on-wing engine washing processes to help make Air Force engines run more efficiently. These technologies are currently in use by the commercial aircraft industry and result in fuel savings, extended engine life, increased time on wing and reduced maintenance costs.

Goal 4: Support the production of energy-informed war plans

We provide the Air Force and Joint wargaming communities with a more realistic view of the risks and challenges related to operational energy and fuel logistics, which better informs leadership about energy decisions in wargaming and ultimately in basing strategy, operational planning, and investment priorities.

Incorporated operational energy into wargaming

In 2018, we became involved in the planning and development of the **Air Force's Title 10 Wargame** series, which led to our active role in Global Engagement 2018, Global Mobility/Agile Combat Support 2018, Long Duration Logistics Wargame 2018, and Futures Game 2019. Our office's participation – along with support from aligned organizations and industry partners – enabled unprecedented incorporation of the fuel supply chain (from refinery to aerial tanker) into the 2018 wargaming campaign and highlighted the key role operational energy plays in combat operations at bases and beyond.

Goal 5: Educate the Force and build a culture for operational energy

Our office encourages an energy-informed culture through education, training, and strategic communications efforts. By publishing informative content, and collaborating with Air Force and Department of Defense learning institutions we are able to communicate to Airmen and service members about the importance of energy efficient operations.

Established Strategic Communications Strategy and Digital Presence

In 2018, the development of our Strategic Communications Strategy mapped out our vision to inform stakeholders about the criticality of operational energy, and led to the redesign and buildout of our public website and social media platforms. Additionally, senior leadership presented at **6 industry conferences** and seminars throughout the year to connect with stakeholders and inform them of our initiatives and how they can help.

Inserted operational energy lesson plans into Air Force Institute of Technology courses

We funded the development of two graduate courses at the Air Force Institute of Technology (AFIT), ensuring that operational energy is at the center of lectures and research efforts.

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No Fuel No Fight