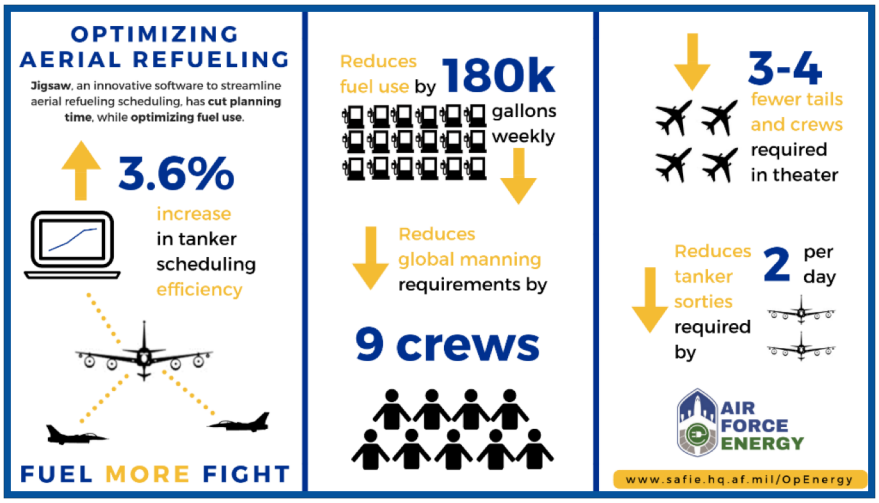
21ST CENTURY PLANNING TOOLS
Developing at the Speed of Relevance

AIR FORCE OPERATIONAL ENERGY

OPTIMIZING AERIAL REFUELING OPERATIONS WITH JIGSAW

The 609th Combined Air Operations Center (CAOC) at Al Udeid Air Base plans and executes the air war for Central Command. From 2013 to 2018, the CAOC produced over **120,000** manned strike sorties. In support of these operations, **U.S. tankers fly roughly 50 sorties per day**, each with complex missions that must be planned, coordinated, and executed by the CAOC. Until June 2017, CAOC aerial refueling planners scheduled hundreds of operations per day on a whiteboard, using markers and "pucks" to designate refueling requests. Spreadsheets supported some calculations, but the overall process relied heavily on brainpower for every Air Tasking Order.

Jigsaw eliminates the need for manual calculations, reduces the potential for human error, and allows re-planning to occur in a matter of minutes. Users in the CAOC report these increases in planning speed and efficiency, noting that Jigsaw adds to execution agility. Ultimately, the tool creates the opportunity for planners to optimize tanker utilization. Air Force Operational Energy and the AOC Pathfinder project understand the value of the tool and support its improvement and sustainment.



Goals for future iterations of Jigsaw include system integration and the addition of an "auto-plan" feature that can match requests to tankers. **These enhancements aim to increase scheduling efficiency by over 10% of the baseline efficiency rates**. If achieved, this would free **25 million gallons of fuel per year**, reduce the number of tankers required for missions, and allow up to 25 crews to be available for other taskings, while maintaining combat sortie rate.

Defense Innovation Unit (DIU) targeted this outdated and labor-intensive process for improvement using agile software development. DIU fielded a prototype software, 'Jigsaw,' that retains the interface of the whiteboard, while automating a series of calculations underlying the planning process. While planners must still manually match tankers to receivers, the expedited process significantly decreases planning time (previously 12 hours, now approximately 4 hours). **Specifically, scheduling efficiency estimated to increase by 3.6% according to a preliminary planning analysis of the tool.**

WHY IT MATTERS

Jigsaw highlights how small investments in 21st century planning tools and processes can result in optimized operations. Improvements to the tool now allow users to operate at the speed of war. Globally, projects like Jigsaw can create efficiencies across the Air Force, easing strain on manpower and tanker assets, enhancing combat capability, and improving readiness.

OUR MISSION

To enhance combat capability and mitigate operational risk to the warfighter through energy-informed solutions.

OUR VISION

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

OPTIMIZING OPERATIONAL ENERGY LEADS TO:

- **INCREASED** Combat Capability
- **INCREASED** Aircraft Lifespan
- **LOWER** Aircraft Maintenance Costs
- **MORE** Training Opportunities

$5-7 BILLION is spent on Air Force aviation fuel **ANNUALLY**

81% of the Air Force **ENERGY BUDGET** is spent on aviation fuel

2 BILLION **GALLONS** of aviation fuel used by the Air Force **ANNUALLY**

8,000 additional sorties fueled from a **1% EFFICIENCY INCREASE**

#FUELMOREFIGHT

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