

# Federal Energy and Water Management **AWARDS** 2014

View from cockpit during  
\$AVE test flight



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In July 2013, two C-17 aircraft successfully demonstrated the Surfing Aircraft Vortices for Energy (\$AVE) concept on an operational mission, achieving a direct savings of \$7,500 in fuel costs. The \$AVE concept uses formation flight principles derived from flocks of migrating birds, with trail aircraft harvesting energy from the upward velocity (or upwash) of the formation leader.

In 2007, the Defense Advanced Research Projects Agency initiated a study with Boeing to investigate what would be required to apply \$AVE to the C-17, the largest consumer of aviation fuel in the U.S. military. Boeing predicted optimum formation positions and developed software, enabling \$AVE

operations with existing C-17 hardware. Following software installation, the successful demonstration resulted in the trail aircraft reducing fuel use by 10,800 pounds.

Air Mobility Command then commissioned \$AVE as an advanced technology demonstration; Air Force Research Laboratory identified potential \$AVE candidate missions and found more than \$10 million could be saved each year in the C-17 fleet alone with minor alterations to mission parameters. By applying the \$AVE concept fleet-wide across the Air Force, possible fuel savings are estimated at greater than \$50 million annually.