



TANKERING BENEFITS TANGIBLE AND ACHIEVABLE

News / Business aviation



Although jet-fuel prices are lower because of the dramatic drop in the price of oil, operators of airplanes that can carry large loads of fuel, especially the increasingly popular ultra-long-range Globals and Gulfstreams, may **benefit** from **tankering** low-cost fuel instead of carrying just the amount of fuel and reserves needed for a particular flight. For many business jet owners, it is precisely the flexibility that long-range jets offer that makes these chariots popular.

Yet pilots often struggle with deciding whether it makes sense to carry extra cheap fuel or to fly the fuel tanks down to a healthy reserve without carrying around the extra weight of apparently cheaper fuel.

There are many ways to approach this conundrum, from tried-and-true and not-so-true rules of thumb to complicated calculations aided by sophisticated software. The advent of cheap computer power and ubiquitous Internet connectivity has led to systems such as [Fuelerlinx's tankering calculator](#), which incorporates real-time fuel pricing and fees to provide tankering go/no-go advice for unlimited trip legs. Other tools pilots use include CAVU's EFB-Pro performance-calculating iPad app, which includes a tankering module, and a relatively simple-to-use iPhone app—AvFuelSaver—developed by Specific Range Solutions.

AIN asked business jet OEMs if they provide specific information to operators about tankering, but most said that they do not publish tankering advice. Gulfstream does offer information in its flight

manuals. According to the company, “We provide fuel tankering information for our large-cabin operators in the Airplane Operating Manual Chapter 11 (Preflight Planning and Performance). This section includes break-even fuel-cost ratios between destination and origin for given route speeds and flight duration. They are found specifically in section 11-07.”

BURN IT OFF

The simplest way to start thinking about tankering is with the burn-off percentage, often referred to as the tankering rule of thumb. A typical burn-off percentage is 4 percent, and that means that for every unneeded 100 pounds of fuel carried, the aircraft will burn an extra four pounds. Some pilots use 3 percent, but the point is that there are penalties for carrying excess fuel, and that penalty is not only the elevated fuel burn but also more wear and tear on engines, which might require more power to propel excess weight; the effect on climb rates and the ability to reach optimum cruising altitudes at higher temperatures; longer takeoff and landing distance; and possible additional wear on the landing gear and brakes.

Corporate pilot Bart Gault, who flies all over the world, considers these and other factors when deciding whether to tanker fuel. He considers the following:

- price of fuel at departure and destinations
- does destination have fuel? (I have gone to locales that do not have sufficient jet-A)
- estimated fuel burns at the various weights with cost calculations and differences
- takeoff runway requirements—conditions (wet runways/icing), altitude, length (Part 25 FAR).
- alternate fuel needs
- landing requirements—conditions (wet runways/icing), altitude, length (Part 25 and 135)
- and parking and handling fees.

With those considerations in mind, he said, “one does a numeric calculation to ascertain the necessity of tankering and compares cost.”

In a 2010 [NBAA presentation](#) about saving money on fuel, Specific Range Solutions owner and engineer Omer Majeed explained the tankering calculation that his company has developed.

According to Majeed’s presentation, “Payload burns the equivalent of 2.5 to 5 percent of its weight in fuel per flight hour, depending on the aircraft and the flight conditions. The payload percent fuel burn is therefore purely a function of time.

“Carrying 1,000 pounds of fuel for a two-hour flight means 8 percent in carried fuel, or 80 pounds [4 percent/hour times two hours]. Therefore, the fuel at the arrival airport must be less than 8 percent cheaper than the price of the payload fuel to justify tankering in the fuel.

“Per the above formula, tankering favors shorter legs as opposed to longer ones. The facility and other fees must also be taken into consideration in the price analysis.” In other words, for a shorter flight, tankering has a lower impact on the overall cost of the flight. When calculating the burn-off percentage per hour, as Majeed does, for a longer flight the cost impact of tankering necessarily is much higher, and the savings at the destination would have to be higher to justify tankering.

Majeed’s iPhone app, AvFuelSaver, costs \$1.99 and is available in the Apple Store. The app is relatively simple and calculates a tankering savings for a two-leg trip, comparing tankering fuel versus uploading fuel for each leg.

Aviation cost analysis company Conklin & de Decker has looked at the tankering situation and generally advises, “Buying fuel at home base for less than on the road can keep your average fuel cost down.” However, the company added, “There is a caveat to this. Carrying extra weight causes you to burn more fuel because climb times are longer and cruise fuel burn is higher. In a Citation II, a thousand extra pounds of weight raises your fuel flow at altitude by about 8 percent.

Conklin & de Decker illustrates the tankering decision using this chart for an actual midsize jet (type not specified). “The chart above shows average fuel burn versus range for either (a) carrying the required fuel plus reserves or (b) carrying as much fuel as the aircraft will allow for the trip to be flown. Note that in the middle, for a 900-nm trip at Mach 0.80, you will burn an average 17 percent more fuel if you carry extra fuel from the home station. For the aircraft in the chart above, you’d better save about 15 percent or more in fuel cost per gallon before you consider tankering fuel.”

IPAD CALCULATOR

CAVU Companies includes a tankering calculator in its EFB-Pro iPad app, but its approach is to keep the process simple and avoid adding too many variables. The way EFB-Pro does this is by limiting the tankering calculation to a single leg.

“There are different ways of looking at how to do tankering,” said CAVU president James Deuval. “We got a lot of input from a lot of people, asked questions and listened.” While he acknowledges that some people won’t buy EFB-Pro because it doesn’t look beyond one leg for tankering, he believes that there are too many variables involved with factoring in additional airports, especially when destinations change during a long multi-leg trip. “I don’t know how in the world you’d run that calculation,” he said. “It wouldn’t be practical day-to-day. Our premise is that you’re taking off and going somewhere else, and we limit tankering to that segment.”

The variables that EFB-Pro does consider include takeoff weight, altitude, temperature, speed, destination fuel price and how much fuel must be purchased to eliminate a ramp fee. “We take the view that you can take off with fuel you buy at a discount, but you have to pay for delivery of that fuel to a new location because it weighs down your airplane,” he explained. “With those parameters, we give a side-by-side analysis of what is the best solution for each number of gallons that you’re going to have remaining after you pull up to the terminal at your destination.”

Deuval said that EFB-Pro sometimes delivers results that show that tankering isn’t always the best choice. “The price is really one variable but not the only variable,” he said. “We’ve gotten results that completely surprised people.” This happens usually when the time in the air is longer because of headwinds, and in these cases, even a \$2 fuel price difference doesn’t make tankering worthwhile. “As you run the calculation, there is usually a bell curve where it makes sense to

tanker for a while,” he said, “then it levels off then makes sense to buy at the other end, depending on the price savings.”

Typical EFB-Pro customers using the tankering calculator are flying midsize and larger jets, according to Deuvall, although even CitationJet and King Air pilots have asked about tankering.

Viewing the Falcon 50 in the EFB-Pro app as an example shows that at a takeoff weight of 35,000 pounds and cruising at above ISA temperature at FL350 for a 4.5-hour flight could yield savings of \$860 by purchasing 884 pounds of fuel at \$4/gallon at the departure point versus paying \$7/gallon at the destination. This takes into account a minimum purchase of 300 gallons to secure a \$500 rebate. Removing the rebate (which could also be considered a ramp fee), the money saved by buying the 884 pounds jumps to \$1,360. This is a somewhat extreme case, with a fuel price difference of \$3/gallon, but prices these days are volatile, and at some larger metropolitan airports, jet-A prices remain quite high.

“We came across many conditions where if crews use the rule-of-thumb they actually hurt themselves,” Deuvall said. “In reality tankering would cost them more than the savings.”

EFB-Pro doesn’t take into account intangible costs such as running engines longer at higher power settings. “You can go to insanity with this stuff. It gets a little bit nuts,” he said.

In any case, there are other considerations besides pure savings on fuel. “Choose the FBO based on the service and total cost of the stop,” Deuvall explained, “not just the cost per gallon. If you save 50 cents per gallon but get mediocre service and pay to park, for using the flight planning room and for the car to go get lunch, did you really save?”

The better way to save money on fuel is tried and true, according to Deuvall: “Slow down. Pulling back on the power levers can save 5 to 25 percent in total fuel used for the same trip. On many short trips, this may mean arriving only a few minutes later. In a business jet, fuel is half to two-thirds of your variable cost. While the whole purpose of the aircraft is to save time, a bit slower speed and careful trip planning can keep your costs down.”

COMPLEX TANKERING

Fuelerlinx has taken a further technological step with tankering and recently introduced integration with iFlightPlanner’s flight-planning system to allow consideration of many more parameters and multiple legs when making a tankering decision. One advantage that Fuelerlinx has is its own real-time fuel pricing system, which delivers prices based on customers’ relationships with fuel providers. When customers sign up with Fuelerlinx, they provide their logon information to whichever of the dozens of available fuel providers that they work with, and Fuelerlinx finds the best prices. The combination of real-time fuel prices and flight planning enables much finer tankering calculations.

Fuelerlinx has offered tankering calculations for a while, but the integration with iFlightPlanner adds more capability. “It runs 500,000 to 8 million scenarios, depending on the complexities of the trip,” said Fuelerlinx founder and president Kevin Moller. “It’s our server array that calculates [the solution], and iFlightPlanner servers work in conjunction with ours.”

Fuelerlinx is an open system, and Moller said the company is willing to work with any flight planning provider on integrating the tankering solution. He wants Fuelerlinx customers to be able to use the flight planning vendor of their choice. Fuelerlinx also works with all of the major

scheduling software packages such as Ascend/FOS, Avianis, Avmosys, Bart/Seagil, Camp, FlightTrak and SchedAero.

What iFlightPlanner does is allow users to check weather, calculate weight and balance, create a flight plan and then choose routing (including direct, customized, recent ATC routes, airways and so on). The user can view winds aloft and optimum altitudes, then look at various fuel loads and how they affect the cost of the trip. The price of fuel at each destination of a multi-leg trip is taken into account, including ramp fees. "Sometimes it makes sense to carry extra fuel at the destination," Moller said, "even though it's heavier. We tell the pilot or the dispatcher, 'When you land at the second stop, skip buying fuel and pay the \$500 ramp fee. It's a breakeven cost analysis, and sometimes it makes more sense to tanker and pay the penalties than to take on more expensive fuel. That's not always the case.'"

To build a trip in Fuelerlinx, the user begins at the dashboard page (or using scheduling software first). After he enters the departure and each leg's destination, Fuelerlinx gets the current fuel prices based on the user's own fuel vendor accounts and presents them in a drop-down menu, categorized by low to high prices. Adding the dates for each leg of the trip pulls in wind information, and automatic fuel releases are generated for the selected FBOs at each destination. The next step is to click on the Trip Planner tab, and this is where Fuelerlinx and iFlightPlanner work together, optimizing each leg, showing the tankering suggestions and potential savings on fuel cost. At each destination, the system will show the user whether or not to take on extra fuel and how much to carry, as well as a savings index showing the benefits of tankering.

Changing a destination either before or during a trip is simple, and everything is recalculated on the fly. "It's designed for somebody with very little flight planning knowledge," Moller said. Of course, pilots who like to "can get surgical" and refine the parameters and get into deep detail if desired. One variable that users can adjust is the burn-off percentage. Fuelerlinx starts at 4 percent, but that can be changed, as can many performance parameters.

"The larger the airplane, the more fuel it holds, the more the ability to tanker," he said. "But we always produce a savings index; it shows the saving potential for each trip. Even if we don't recommend tankering, people still like to do it, even if it saves only \$50."

Another useful Fuelerlinx tool is the proximity map, which shows airports in a particular area with a user-set minimum runway length and with current fuel prices. This is helpful for finding a good place to stop or when looking for alternatives in metropolitan areas when the major airports have excessively high fuel prices.

The tankering calculations are included in a Fuelerlinx subscription. Prices begin at \$199 per month for one aircraft and grow to \$349 per month for two to three aircraft or \$549 for six aircraft. Fleet pricing is available, too. Fuelerlinx currently has about 1,500 aircraft enrolled, and the customer base is split evenly between Part 91 and 135 operators.

"Fuel pricing is always volatile and it will go up," Moller concluded. "Even if it is low it is the single largest part of direct operating costs. If you can save more when fuel is cheaper, you'll be saving even more to the bottom line when prices do go up."

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