Smart Planes Save Oil
By Bennett Cohen

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Without oil, most Americans would be hard-pressed to get more than a few miles from home. In fact, U.S. mobility (the movement of people and things) is 97 percent dependent on oil-based fuels. Because of the tremendous toll oil use takes on the environment, the economy, and national security, industries—including air transport—are searching for ways to use less.

If you are flying with one of America's largest carriers, the plane you're on is probably between 13 and 15 years old. Commercial airplanes represent large capital investments; they aren't traded in as quickly as cars and trucks, for example. Because of the glacial pace of airplane fleet recapitalization, new power systems and aircraft designs take a long time to affect overall fleet efficiency and produce significant oil savings.

There is a way to achieve oil savings in the air without waiting for the airplane fleet to recapitalize: make airplanes smarter. Specifically, retrofitting existing airplanes to be compatible with next-generation air traffic control (NextGen ATC) can save 10–12 percent of aircraft fuel use by 2030.

Today's airplanes are dependent on a centralized, technically limited, ground-based control system that keeps aircraft at safe distances from one another and determines flight paths. This system is based on 1940s WWII technology, which can have difficulty distinguishing between planes and migratory birds. NextGen ATC will rely on digital technology in every plane, and allow tomorrow's pilots to organize themselves in a safer and more efficient manner.

Retrofitting an airplane fleet with Automatic Dependent Surveillance-Broadcast (ADS-B) technology will allow planes to determine their own position using a global navigation satellite system rather than rely on someone on the ground. A plane will broadcast its position in a unique digital code, along with information about the type of aircraft it is, its speed, flight number, and trajectory to other aircraft within 200 miles. They will then use the information to determine their own flight paths.

NextGen ATC will save fuel from takeoff to touchdown. Planes will fly a precise path, optimized for efficiency and directness, saving fuel that would be wasted on unnecessarily longer flights. More planes will be able to fly more directly, as airplanes won't need to fly as far apart, and direct flight paths can be closely spaced, parallel, or "stacked." In addition to more point-to-point navigation, NextGen ATC will allow planes to make route and altitude deviations to take maximum advantage of favorable, fuel-saving winds.

During descent, NextGen ATC will allow planes to follow a "continuous descent approach" (CDA), during which the engine idles and the plane descends to touchdown consuming minimal amounts of fuel, instead of following the typical (and inefficient) "step down" descent approach.

Though full implementation could take up to 20 years, improvements in efficiency, safety, and capacity will occur with each flight guided by NextGen ATC.

While new and improved methods of producing energy will play a critical role in reducing U.S. oil dependence and addressing other energy problems, opportunities to make systems smarter and logistically better can save considerable amounts of energy while creating many other benefits. Next-generation air traffic control demonstrates how improved information technology and decentralization can make systems more efficient while improving safety and capacity, and reducing cost. The implementation of "smart grid" technologies (bringing digital technology to the electric grid) is another opportunity to eliminate wasted energy, reduce costs, and increase reliability by making a system smarter.

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