Better ways to fly using less.

What it is

Aviation produces up to 5% of national carbon emissions in countries like the UK, growing every year - 2% globally. However, because of the relative impact of vapour trails, cirrhus cloud formation and other factors, it is likely that this 2% represents 3.5% - 5% of the total human impact of global warming. Many aircraft flying today were made over 25 years ago and waste fuel. Simple steps can be taken to improve fuel efficiency in older planes – by as much as 7%.

Future of Aviation post written in 2009 - very accurate.

How it works

When aviation fuel was cheap, manufacturers were lazy about fuel economy in wing and body design, and buyers were reluctant to pay extra for these features. An example is the ends of wings, which cause air turbulence during flight. By adding sky-pointing tips, fuel economy can be improved by up to 7% in the case of Learjets and 3.5% in large passenger jets (eg Boeing 747-400). Raked wing tips (altering the shape of the whole wing) can also improve efficiency in larger planes by up to 4.5%.

New planes are already 70% more efficient than 40 years ago and 20% better than 10 years ago. We can expect a further 25% energy saving by 2030 for new planes – better than 3 litres of fuel per passenger per 100km flown – better than a small car could provide in 2010.

Expect fuel economy also to be improved by:

- Fuller plane occupancy – almost all the weight of a large plane is the plane itself plus fuel carried, so the cost of extra passengers is marginal. For example an empty 747-400 weighs around 340,000 pounds, which increases on takeoff to 800,000 – but only 250,000 pounds is actual passengers or cargo – the rest of the addition is almost all fuel. A single extra passenger is only 150 pounds extra in weight (plus a small amount of additional fuel).

- Better air traffic control, including more direct air routes, and more efficient operations

(more passengers per flight). This can reduce fuel use by up to 18% on short haul flights. All flights into Heathrow for example have to timetable an average 15-20 minutes onto journey times because of congestion – which is very significant on short haul services.

- Flying slightly more slowly.

- Steeper landing paths.

- More efficient use of jet streams, or avoidance of them - high velocity, high altitude air flow

- Increased use of turboprop aircraft for shorter distances (better fuel use)

Why this all matters

Carbon emissions from flying doubled from 1990 to 2004, will double again in the next 20 years, and are now the fastest growing cause of global warming. The aviation industry is under intense pressure to reduce emissions per mile flown, especially as aviation fuel is untaxed which means flying has a huge (unfair) economic advantage over driving the same distance.

Challenges

As we can see, the technology is here already to make huge energy savings in aviation. However retrofitting older aircraft is expensive, and these less efficient planes can fly for 20-30 years more if well maintained. It will therefore be a very long time before less efficient planes have all been retired or refitted. Replacing old planes is certainly an effective strategy: for example Alaska Airlines will save 18% of fuel by replacing MD-80 planes with 737-800s. But what happens to the old ones? History shows they usually land up being sold to less wealthy airlines in emerging nations – so continuing their inefficient working lives.

Biofuels for aviation

Expect to see rapid growth in air miles powered by biofuels which were first approved for use in commercial aviation in 2011. The issue is not whether they work in planes. They really do. What matters is the wider impact on the environment from manufacturing them. Already 40% of

the entire grain output of America is burned as fuel - a staggering statistic considering that 1 billion people go hungry each day, and that one of the most frequent questions I am asked as a global Futurist is how on earth we are going to feed a future population of 11 billion.

Some argue that biofuels can be made more ethical by only using bio waste - but we are already seeing farmers switch to making such crops as a primary product, and all these biofuels place an added premium on land use, encouraging diversion of farm land from food, increasing the price of land, increasing incentives for cutting down more forests.

Despite all that, we can expect all aviation fuel in many nations to be mixed with biofuels by 2030.

Business opportunity

Since at least 30% of aviation costs are fuel, airlines also have strong economic reasons to reduce carbon use. There are hundreds of small and large opportunities in the aviation industry to help create further efficiencies in how fuel is used during flight, and in how efficiently each flight is utilised to carry cargo or passengers.

Read more on aviation fuel efficiency and greener airlines / air travel.