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Taxing Times for European Airlines

Rising fuel costs have steadily increased the cost of buying an airline seat in Europe and other regions. Will carriers apportion a tax per flight to push up ticket prices even further?

There are only two certainties in life – death and taxes. The second looks imminent for the aviation fuel industry. With economic recovery pegged to start in 2010 fuel prices will rise alongside demand. There could be challenging times ahead for operators trying to maintain profitable pricing structures if the intended air taxation takes to the skies.

Direct taxes on all forms of income and some products purchased attract a complex scale of government structured tariffs. There are the so-called ‘stealth taxes,’ which you pay without actually recognizing as formal levies. Particular to the United Kingdom, stealth taxes include environmental levies as well as taxes

on house sales. Most would agree that taxes are necessary to maintain the social mechanisms and government run infrastructures, as well as the provision of health services and public transport to name but a few.

Each time the motorist fills up his tank a proportion of that gallon or liter cost is sequestered into the government’s treasury coffers. In the UK over 66% of the price of unleaded petrol is made up of tax and higher polluting, lead heavy fuels attract an even higher tax.

Traditionally commercial aviation has escaped any direct

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NFR: Alternative Jet Fuels...

Fueling Controversy

Carbon emissions have become a political hot potato, especially in Europe. As a high profile burner, if not polluter, the aviation industry is under constant fire to reduce its afterburn.

Despite the global economic downturn, the aviation industry is keen to seen to be green and biofuel experimentation is still underway with certification on the horizon. A series of recent test flights from airlines across the world show promising results. There are even hopes that alternative fuels may be used commercially in the next five years.

Virgin Atlantic Airways led the way in February 2008 with a part-biofuel flight, with Air New Zealand, Continental Airlines and Japan Airlines conducting biofuel demonstrations after last year’s huge volatility in the fuel market.

Progress has been swift. A year ago, pushed aggressively by its founder **Richard Branson**, Virgin Atlantic used a first-generation, 20% biofuel blend to power one of four General Electric CF6 powerplants on a Boeing 747-400, and already airlines have begun testing second-generation 50% biofuel mixes, in some cases on twin-engined aircraft.

Air New Zealand operated one

(Continued on page 5)



Environmental groups point to the exponential growth of air travel and its impact on climate change as a strong case for taxing airlines for the fuel they use.

taxation on the fuel it pumps through its increasingly efficient engine cores. Aviation fuel is currently exempt from taxation because of international agreements under the Chicago Convention not to tax fuel used for international air travel.

From a practical standpoint taxing aviation fuel would necessitate a global solution. This would involve all countries agreeing to apply the same taxable rates and ensuring that the levy in Rome would be the same as in New York taking into consideration fluctuations in the oil price. Such a task would be easier said than done. But with growing emphasis upon climate change and with the emissions contribution of aviation a hot topic, some form of taxation appears to be inevitable.

The Case for Taxes

Environmental groups point to the exponential growth of air travel and its impact on climate change as a strong case for taxing airlines for the fuel they use. The same groups point to the UK where the tax exemption amounts to the government subsidizing the airline industry to the tune of GBP 9 billion (USD 13.1 billion) a year.

Governments are also listening to increasingly vocal concerns on emissions and have accordingly introduced some sort of levy even if added to the price of an air ticket. The Dutch parliament has recently voted on a scaleable duty to be applied to tickets called a ticket tax. In the UK passengers are charged an additional Air Passenger Duty (APD) with rates of the tax varying according to domestic or long haul destinations. Regarded as an environmental tax APD does not contravene the agreements under the Chicago Convention, as it does not constitute a direct tax on fuel.

In Britain air travel accounts for a throughput of approximately 200 million passengers flowing through the departure gates. Despite the current downturn, the expectation is for passenger volumes to rise to 500 million by the end of the first quarter of this century.

As a consequence of not being subjected to the same level of taxation as other forms of transport, commercial

aviation in Europe can expand its aircraft fleet base in order to service burgeoning passenger volumes. The advent of budget airlines such as the no frills EasyJet and Ryanair make flying an affordable and in many cases a cheaper alternative to the train. Some environmental groups claim that this convenience and affordability will result in greater volumes of unchecked greenhouse gases being pumped into the atmosphere thereby speeding up gross environmental damage.

According to EUROPA, the European Commission's website, emissions generated from air travel within the EU have increased by 70% since 2002. Many believe that taxation is the only effective measure in holding commercial aviation accountable for its emissions output, which is encouraged by indirect industry subsidies. Mechanisms such as emissions charges, emissions trading, departure taxes and fuel taxes have been proposed.

The Airlines Strike Back

Naturally airlines have countered the taxation arguments, although some agree that measures need to be considered with regard to reducing emissions without the need for punitive charges. Many carriers insist that they are investing in fuel efficient engines and that emissions can be controlled and therefore reduced.

EasyJet, for instance, has been a strong supporter of a carbon tax on a per flight basis believing that its airplanes are the least polluting when compared to other rivals. However, at the same time, the carrier believes that it is imperative to abolish air passenger duty if such a tax comes to fruition.

The British government had been toying with the idea of introducing a green tax according to the amount of carbon dioxide produced by each flight. This was to replace the APD in 2009. Much to the consternation of both airlines and environmentalists the Government has chosen to retain the passenger duty choosing to increase the tariff structure and shelving the proposed carbon green tax. Many argued that the carbon

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The carbon tax would mean lower fares for passengers if APD had been scrapped.

tax would have ensured that most airplanes would fly to near full capacity to offset the levy. Budget airlines such as EasyJet stand beside their low carbon emission planes. They had much to gain from the carbon tax as the majority of their flights constitute shorter hops compared to long haul carriers. The carbon tax would mean lower fares for passengers if APD had been scrapped.

On the other hand the possible restrictions of bilateral agreements may have meant that the UK tax initiative would have been construed as an indirect tax on fuel, which is presently prohibited under the Chicago Convention. But with a government feeling the pinch from nationalizing debt ridden banks and facing lower tax receipts in 2009, the prospect of losing GBP 2 billion (USD 2.9 billion) generated annually from APD would have been hard for the chancellor to reconcile.

Government fiscal challenges aside, airlines often cite that the introduction of tax measures would undermine their competitiveness. They believe that EU based carriers would be at a disadvantage vis-à-vis US based operators. Furthermore, airlines feel that aviation is one of the key drivers behind economic growth and GDP, so any taxation measures could create a disincentive to travel.

Any specific tax initiatives introduced within the borders of one country could damage that country's economy. Taxation could force some carriers out of business and drive cargo flight businesses to operate from other destinations. The void would be filled by competitive foreign based airlines, much to the detriment of the local economy. There is also a prevalent suspicion that tax raised by governments would not be used for resolving environmental problems or to invest in carbon neutral technologies.

Current Taxes

The arguments for and against the introduction of taxes on aviation by both industry and politically mobilized environmentalists will continue until the controversial subject of taxation is addressed in real terms. But what of current levies upon aviation? Is the

concept of subjecting airlines to fuel taxation uncharted territory?

Not where beleaguered carriers based in India are concerned. On the subcontinent, airlines such as Kingfisher and Jet Airways are struggling under the burden of domestic levied taxation on aviation turbine fuel (ATF).

The rates vary across various independently governed states but can amount to a whopping 30%. Both airlines have claimed that harsh tax increases have drastically eroded profitability, leaving them unable to cover operating expenses. Revenue shortfalls have forced both airlines to raise ticket prices and lay off staff. A slowdown in domestic air travel is partially driven by economic factors. High fuel taxes have meant slashed margins and domestic air travel has become prohibitively expensive for the indigenous population, which is shuddering from the icy blasts of the recession.

The Federation of Indian Aviation, which represents most domestic carriers, is lobbying the government for permission to import cheaper fuel directly in an attempt to bypass local taxation. If permission is granted this could help return local operators to a semblance of profitability, as most struggle to fly with half full airplanes

The subcontinent example may not be motivated by environmental concerns, rather it is focused on raising revenues to bolster financial reserves within local government. It is, however, an indication that going it alone on the taxation front could be potentially damaging to the airline industry. This reinforces the argument that if taxation on commercial aviation is pursued it needs to be on the basis of global agreements to create a level playing field.

GA Blues

Since general aviation (GA) is classed as private flying, it does not enjoy the same exemption status as commercial flying. Since the 1980's British Avgas (aviation gasoline) widely used in GA piston aircraft was taxed at half the rate of duty applied to

(Continued on page 4)

Furthermore, airlines feel that aviation is one of the key drivers behind economic growth and GDP, so any taxation measures could create a disincentive to travel.



Airlines have greeted the EU trading scheme with lukewarm enthusiasm.

petrol for road use. AvTur – aviation turbine fuel is used minimally and did not attract any levies for private use.

However, this reduced form of taxation fell foul of EU laws making it illegal for the UK to apply such lower tax rates. Britain was in a state of ‘derogation’ or a transitioning period to mitigate the eventual rise in duty once the ‘derogation’ elapsed in 2006. However, following a consultative period with the intervention from AOPA, Avgas was reclassified as a specialist fuel attracting an EU minimal rate, which would not be noticed by the GA community. AvTur did not escape and because of its minimal use in recreation flying, EU law warranted a duty increase taking it to over fifty pence a liter. The government has introduced an ‘honesty box’ scheme for the collection of the tax.

So What Will the Future Bring?

The issue of taxation has gained momentum with many European airline operators now tentatively gearing up for eventual inclusion in the EU Emissions Trading Scheme expected to be in 2010.

This EU cap and trade policy establishes a limit or cap on the pollutants emitted. Companies or sectors within the trading scheme are provided with carbon credits or allowances giving them the license to emit a certain amount of greenhouse gases. However, the total amount of allowances distributed cannot exceed the cap, thereby controlling emission output. If companies produce beyond their allowance they are required to purchase further allowances from those who emit less or face fines. The buyer pays to pollute more while the seller trades the surplus carbon credits and is rewarding for generating less greenhouse gases.

Airlines have greeted the EU trading scheme with lukewarm enthusiasm. The larger long haul carriers with older less fuel-efficient aircraft may exceed allowances and could be forced to purchase more credits. Smaller budget airlines like EasyJet with newer fleets might benefit and could be trading carbon credits for cash.

All airlines will likely be restructuring and cutting costs amid the current economic gloom, which could mean the phasing out of less fuel efficient aircraft. There will also be a greater impetus on the development of biofuel alternatives with several airlines participating in second-generation ‘drop-in’ fuels trials. Certainly greater use of such green alternatives would ensure that some carriers might not exceed their allowance cap.

It remains to be seen if commercial aviation is included in the trading scheme within the intended time frame. Revival of economies and returning people to employment could perhaps move the taxation issue on aviation down the political agenda. Aviation no doubt contributes to economic growth and anything restricting the potency of such a revenue generating sector may not be in the best interest of surviving the global recession.

Both supporters and detractors of aviation taxation will no doubt be keeping their eyes peeled for significant moves that could change commercial aviation forever. **JFR**

Please Complete the Annual AAG Surveys...

Every year for the past 10 years AAG has surveyed airlines and jet fuel suppliers to determine the “Best Jet Fuel Marketers” and the “Best Airline Fuel Departments” in numerous service categories. The surveys also identify key issues both positive and negative regarding airline/supplier relationships. Please take the time to complete the surveys and return them as soon as possible.





**NFR: Alternative Jet Fuels...
Fueling Controversy**
(Continued from page one)

Rolls-Royce RB211 engine on a 747-400 using a 50:50 biofuel blend of Jet A1 and jatropha oil during a two hour



trial on 30 December in Auckland. Continental followed with a 50:50 mix of Jet A1 and biofuel derived from 95% jatropha oil and 5% algae oil to power one of two CFM International CFM56-7B engines on a Boeing 737-800 during a two hour test on 7 January in Houston, Texas. Japan Airlines then tried out a biofuel comprising oils from camelina (84%), jatropha (under 16%) and algae (under 1%) to fly a Pratt & Whitney JT9D-powered 747-300 during a one hour flight on 30 January in Tokyo. The next steps are likely to focus on certification rather than proof of concept.

Certificating body ASTM International is not expected to request additional demonstrations, but could ask for endurance testing on specific engine components. Boeing is now so confident that certification is imminent that revised its previous forecasts for a 2013 ticket and now agrees with Honeywell's fuel technology subsidiary UOP that certification could happen with a 50% blend as opposed to a 10% blend by 2010.

Feedstock Production

UOP expects certification of a 100% biofuel to follow in 2013, because it says there is not enough feedstock now available for mass use of a 100% biofuel. The Honeywell subsidiary plans to license its renewable jet fuel refining technology in the first half of 2009. The company says that with refining technology in place, biofuel production levels could reach hundreds of millions of liters by 2012.

This mass production is key to

commercial adoption as fuels made from feed stocks such as algae and plants such as jatropha and camelina work with existing infrastructure such as tanks, pipelines and aircraft engines, unlike earlier alternative fuels such as ethanol or biodiesels.

Biofuels can be derived from different feed stocks. According to Continental chief executive **Larry Kellner**, bringing another fuel source to the market will help to stabilize pricing, critical in an environment where fuel accounts for 25-40% of costs and the price of fuel can increase.

Although Jet A1 and biofuel produce around the same amount of carbon dioxide in the air, the carbon savings come during the production process. Additionally, biofuels absorb CO₂ and the latest variants will not affect the food supply or contribute to deforestation.

Stakeholders in the latest trials worked with the USA's Commercial Aviation Alternative Fuels Initiative (CAAFI) and ASTM to decide what on the requirements for certification. ANZ, JAL and Continental's demonstrations were tailored to that end, with tests at various altitudes under a variety of operating conditions to measure the biofuel's performance.

Airbus

JetBlue Airways says that is preparing to operate by spring 2010 an Airbus A320-200 on a trial of a second-generation biofuel, made from non-food feedstock. The airline will operate a second-generation biofuel test. The low-cost carrier is preparing for an Airbus A320-200 trial by spring 2010.

According to Flight International, JetBlue teamed up with Airbus, International Aero Engines (IAE) and UOP. Feed stocks being considered for the trial include jatropha, algae, waste forest residues, organic waste streams and the non-edible component of corn plants and corn stover.

United Airlines is also looking beyond plans to demonstrate a 50% gas-to-liquid synthetic fuel blend on an Airbus A320 flight from Denver in

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United expects to be the first US carrier to use a gas-to-liquid kerosene blend in revenue service with a late August flight, if ASTM approves 50% gas-to-liquid kerosene blends this summer.

June. The carrier is examining how airlines will be able to secure adequate supplies of gas-to-liquid kerosene.

According to **Robert Sturtz**, United's managing director of strategic sourcing-fuel, fuel companies may not be prepared to risk investing in a new fuel, so he is looking to group with other airlines to support a production plant that will produce scalable amounts of gas-to-liquid kerosene. United expects to be the first US carrier to use a gas-to-liquid kerosene blend in revenue service with a late August flight, if ASTM approves 50% gas-to-liquid kerosene blends this summer. It is working with synthetic fuel producer **Rentech**.

In the Middle East **Qatar Airways** is also preparing to test a gas-to-liquid kerosene blend on a revenue flight during the second half of this year, likely on an **Airbus A340-600** between London and Doha. Gas-to-liquid contributes to the diversity of aviation fuel supply in the near term, however **Qatar** is also interested in exploring biofuels.

Those two commercial flights will be the first to use a gas-to-liquid kerosene blend more than a year after **Airbus** conducted an **A380** trial with one **Rolls-Royce Trent 900** engine burning a 40% blend of gas-to-liquid and fuel made by **Shell International**. **Airbus** predicts **ASTM** will certify a 100% gas-to-liquid fuel by 2013.

In 2008 **Air France-KLM**, **Air New Zealand**, **All Nippon Airways**, **Cargolux**, **Continental Airlines**, **Gulf Air**, **Japan Airlines**, **Scandinavian Airlines** and **Virgin Atlantic**, which account for 15-20% of the world's civil jet fuel use - joined forces to form a **Boeing-co-ordinated biofuels initiative**, the **Sustainable Aviation Fuel Users Group**, which aims to replace some fossil fuels with biofuels from 2013.

Military Precision

Commercial carriers are not the only ones experimenting with biofuels. The **US Air Force** is expanding its alternative fuel development program to include certification of two 50% bio-fuel blends. The **USAF** is to issue a request for proposals for two biofuels in spring

as it aims to meet half of its domestic fuel needs by 2016 with domestically produced alternative fuels. Meanwhile testing continues at **Ohio's Wright-Patterson AFB** to certificate the **USAF's** entire fleet to use 50% **Fischer-Tropsch** blends by 2011.

Proving that fuel cell and biofuel innovation is taking place across the aeronautical spectrum, this June a modified **Alpi Aviation Pioneer 300** ultra light is expected to fly using only batteries. Next December it will fly on fuel cell power alone. **Skyspark**, an all-electric prototype is designed to demonstrate take-off and cruise flight using only fuel cell power. The June flight will test the aircraft's systems as a safety precaution before the fuel cell is used.

The project is the brainchild of a **Turin-based** company, which created **Skyspark's** electric motor. The liquid-cooled engine is able to push out peak power of 75kW, but normally produces 60kW. The designers are aiming for a 135kt (250km/h) cruise speed and a top speed of 172kt.

Project leader, aeronautical engineer and former **European Space Agency** astronaut, **Maurizio Cheli** says: "The fuel cell power has other applications such as unmanned air vehicles." **Cheli** expects **Skyspark** to have an endurance of about 35min and with the fuel cell about one hour and will put this to the test at the **International Aeronautical Federation's** world air games being held in **Turin** in June.

The project is supported by donations of equipment and people's free time. It is not the first fuel cell project to come out of Europe. A year ago in February and March 2008 **Boeing Research and Technology Europe** flew a battery-assisted fuel cell-powered **Diamond Aircraft Dimona** in **Spain**. **Boeing** says the aircraft will not fly again, but that the fuel cell technology will be applied to other projects, although it remains tight-lipped as to which projects will benefit.

Why Research is Crucial

With all this research in place,
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The USAF is to issue a request for proposals for two biofuels in spring as it aims to meet half of its domestic fuel needs by 2016 with domestically produced alternative fuels.



Europe's airlines are facing major additional costs because of imminent entry into the European Union's emissions trading scheme.

Boeing is calling on European airlines to look for government assistance to help tackle aviation's costly environmental burden. At a recent summit in London 40 airlines - including Lufthansa and low-cost carrier Ryanair - joined leading bankers, senior figures from manufacturing, leasing companies and aviation industry groups.

Europe's airlines are facing major additional costs because of imminent entry into the European Union's emissions trading scheme. Boeing managing director of environmental strategy **Billy Glover** says efforts should focus on three areas including government policy and regulation, air traffic control and support for biofuels.

He says: "Three years ago we did not think it would be technically possible. Now we believe it's a realistic near-term prospect. All it takes to make this a reality is for these technical applications to receive investment for the industrial to achieve the necessary scale-up."

Global aviation is under enormous strain to deliver a climate deal. To speed up the process a group of four airlines has formed a new pressure group to chivvy their peers in the global arena. The new coalition dubbed the Aviation Global Deal Group, AGD) is the creation of Air France/KLM, British Airways, Cathay Pacific, Virgin Atlantic and British airport operator BAA, overseen by the environmental lobby group The Climate Group.

The group met in Hong Kong earlier this year and called for a "pragmatic, fair and effective global policy solution for the sector." The move is seen as a challenge to the International Civil Aviation Organization (ICAO), which represents 190 signatory states around the world. ICAO has been criticized for not acting swiftly pressure on the sector mounts.

ICAO's 15-member Group on International Aviation and Climate Change (GIACC) is tasked to make recommendations by mid-year on an agreed strategy to reduce aviation emissions. ICAO will then propose these recommendations at the United Nations Framework Convention on

Climate Change (UNFCCC) summit in December.

However, a sticking point is Europe's insistence that ICAO move to introduce globally accepted trading measures. Fears from the EU are that aviation risks being hammered by aggressive international deals on climate change. The AGD is calling for carbon dioxide emissions from international aviation to be included in a new global climate deal.

Its proposals include areas of concern from the aviation industry, such as any cap on emissions should offer genuine environmental benefits. AGDG also wants any agreements to be operationally and economically sound, competitive and reflect the UN climate change principle of "common but differentiated responsibilities" between countries with different levels of development.

Tony Tyler, chief executive of Cathay Pacific Airways, said: "We hope the work of our group will offer a practical industry-led solution that creates a level playing field and appeal to policy-makers, environmental groups and businesses alike."

ICAO countered by gathering this month for the third time to discuss how to tackle mounts pressure to fold aviation into the global climate deal that the United Nations Framework Convention on Climate Change (UNFCCC) will negotiate in December.

Political Motivation

It is vital for the aviation sector that it comes to a consensus on tackling carbon pollutants. Aviation emissions were not included in the previous Kyoto framework, and are not managed under any international climate change treaty. General consensus is that 2050 should be the deadline for long-term reductions and the working group will propose 2012 as the timeframe for whatever short-term goals are identified. GIACC will gather again between 1-3 June.

To add to the pressure on the industry, in the UK one political entity has proposed rationing air travel - ie introducing personal carbon trading -

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The group met in Hong Kong earlier this year and called for a "pragmatic, fair and effective global policy solution for the sector."



"We will have to constrain demand in an absolute sense with people not allowed to make as many journeys as they could in an unconstrained manner."

to force individuals to manage their individual carbon dioxide emissions. **Lord Turner**, chairman of Britain's independent Committee on Climate Change, recently said: "We will have to constrain demand in an absolute sense with people not allowed to make as many journeys as they could in an unconstrained manner."

The Committee on Climate Change advises the British government on progress towards meeting some of the world's most draconian carbon reduction targets.

However, the idea drew opposition, notably from the pro-aviation group FlyingMatters. Chairman **Brian Wilson** condemned the idea and said: "One always suspects with these half-baked proposals that the people who put them forward really intend them to apply to ordinary people rather than to themselves."

According to Turner, his committee will study aviation emissions to consider what can be achieved through efficiency gains, including biofuels before forging ahead with individual flight curtailments.

The UK Department for Environment, Food and Rural Affairs (Defra) concluded in a study last year that while personal carbon trading could persuade people to combat climate change, for now it remains a suggestion only, especially given the cost of implementation. That price factor caused the creator of the European Union Emissions Trading Scheme, Dutch consultancy CE Delft, to drop any idea of the passenger as the trading entity, pointing out that "obliging passengers to surrender allowances would involve enormous transaction costs, as millions of allowance traders would have to be supervised and monitored."

Funding Initiative

On the bright side for the industry, the US Departments of Energy and Agriculture will allocate up to \$25 million in research and development funding for biofuels, including aviation fuels through the US Food, Conservation and Energy Act passed last year. The Air Transport

Association of America (ATA) was delighted with the funding. "We are thrilled that the Obama administration has worked quickly to secure this funding for alternative energy," ATA president and chief executive **James May** said. "This commitment to the research and development of advanced renewable fuels will allow for commercial-scale demonstration projects and other important activities that will move us closer to commercially viable, environmentally friendly alternative jet fuel. ATA and its member airlines look forward to working with the federal government to further promote the rapid development of these exciting new fuel sources."

Award amounts will be between \$1 million and \$5 million with project periods up to four years, subject to annual appropriations. **JFR**

"We are thrilled that the Obama administration has worked quickly to secure this funding for alternative energy," ATA president and chief executive James May said.



Diesel Power Throttles Up

As the prevalence of Avgas diminishes, there could mean troubling times ahead for General Aviation. Could diesel fuel oil be the answer for an industry potentially facing an early grounding?

Pound for pound there is more punch offered by diesel, hence its adoption by heavy road haulage and aerodynamically challenged agricultural equipment.

General aviation's (GA) new savior has actually been kicking around for eighty years. Using diesel in aviation is nothing new, however, the fuel is experiencing a renaissance thanks to new technology creating lighter, highly fuel-efficient engines.

Diesel regarded as a heavy fuel, a gallon of which possesses a much greater thermal energy content than a gallon of avgas. Pound for pound there is more punch offered by diesel, hence its adoption by heavy road haulage and aerodynamically challenged agricultural equipment.

The first recorded venture into diesel powered aviation was the maiden flight of a Stinson Detroit in 1928. The high wing monoplane had been mated to a specially adapted Packard car diesel engine. Four years later in 1932, pioneering aviatrix **Ruth Rowland Nichols** established an altitude record over New York City in a diesel powered Lockheed Vega. She dubbed the Vega the 'Fly Furnace' and used the fuel efficient plane in a 3,000 mile goodwill tour to promote "The International Congress of Women" in Chicago.

At around the same time the Germans (who came up with the idea of diesel engines in the first place) manufactured the Jumo aero engine. Given the many challenges of producing an engine light enough for an airframe, they managed to develop a powerplant, which plugged into early Dornier and Junkers planes. From light bombers to flying boats, the Jumo engines saved the Luftwaffe thousands of gallons of fuel that they needed for their stretched fighter squadrons.

However, thanks to the unwieldy engine blocks required for diesel, the fuel quickly fell out of favor especially with the advent of the jet engine, its use in aviation appeared relegated to the confines of history. The fundamental problem with diesel

engines was always going to be excessive weight imposed upon an airframe.

The benefits of diesel, primarily its efficiency and torque are as a consequence of the higher compression of fuel and air in the engine's cylinders. This creates an explosive amount of raw power, which only the strongest and heaviest of engine casings could safely contain. This is ideal for a locomotive, but its application in aviation seemed somewhat limited for the likes of a delicate Cessna 172.

Diesel Technology – Old is New Again

Thanks to the volatility of oil markets and the frequent cutting of production capacity by OPEC members, alternatives to traditional avgas could be necessary as fuel prices rise. Most light piston engine aircraft use leaded high octane fuel designated 100 LL. Although widely available in the US and continental Europe, the fuel is relatively scarce in other parts of the world.

One solution is the use of diesel cycle engines, which are not only able to use diesel fuel oil but also aviation turbine fuel (AvTur). In the distant future diesel could become the fuel of choice for GA, as it takes advantage of newer, more sophisticated engine technologies.

The limiting factor surrounding engine weight has been resolved through use of modern materials, precise casting processes and manufacturing methods. The engines are smaller and lighter, benefiting from computer controlled fuel injection systems to derive even further efficiencies from the use of diesel fuel oil. Furthermore, turbochargers have been added to

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The fundamental problem with diesel engines was always going to be excessive weight imposed upon an airframe.



GA has been slow to embrace diesel, despite its credentials of low costs and increased range.

the Diamond DA42 TwinStar.

Other manufacturers are wading through the certification process governing kit build aircraft and experimental airframes as a way to introduce diesel powerplants. For instance IndUS Aviation unveiled its diesel powered Thorpedo light sport aircraft in 2008.

GA has been slow to embrace diesel, despite its credentials of low costs and increased range. The fact remains that existing and ageing legions of light aircraft both in the US and Europe still fly on avgas and will continue to do so without their owners considering costly diesel retrofits. The engine technology for aviation use, although advanced, is still in its relative infancy, with only Diamond presently offering certified engine options on its certified aircraft range. SMA will likely follow as an OEM supplier for factory installed diesel engines as such powerplants trickle into the market.

If Cessna were to restart its stalled turbo diesel 172 product offering this would likely boost acceptance as it would be a significant commitment by a large mainstream airframe manufacturer.

However an unexpected detractor of diesel cycle engines could hamper widespread introduction.

ExxonMobil Pulls the Plug?

In November 2008 ExxonMobil sent a letter to all US distributors of Jet-A fuel prohibiting the supply of its jet fuel to diesel powered aircraft through an indemnity agreement. The fuel supplier cited technical reasons, such as ignition performance of using Jet-A, the possible low freezing point due to lesser speeds at high altitudes and using fuel as a lubricant.

The ExxonMobil move may be a precautionary measure, which could in time be addressed by the FAA and the aviation fuel industry as a whole. Diamond Aircraft and DeltaHawk engines have responded by highlighting some of the rigorous tests

made through the exacting FAA certification process. Although this development slows the likelihood of new customers signing up for diesel engine aircraft, particularly in the United States, it does not represent a premature demise of the industry.

In the instance of a major airframer receives Supplemental Type Certification (STC) for an airplane using a diesel option from an OEM supplier then all possible doubts concerning the powerplant would vanish. The successful SMA /Maule-9 engine and airframe collaboration if certified could prove significant enough to alter people's perceptions.

Is Biodiesel an Alternative to Jet-A?

The use of biodiesel as a possible alternative to pure jet turbine came a step closer recently when a surplus Aero L-29 military trainer jet successfully completed a US transcontinental flight in October 2008 using a biodiesel fuel mixture. The biodiesel in question was derived from animal fats and soy blend to create a fuel with the same characteristics as diesel.

The Aero L-29 owned and operated by Green Flight International achieved 1,776 miles out of the 2,486 mile journey through 100% of the biodiesel blend. The remainder of the leg was completed with a 50:50 mixture of normal Jet-A and the biodiesel component.

The milestone flight following on from many other biofuel flights raises the prospects for biodiesel being used in commercial aviation. One of the major drawbacks to biodiesel is its low freezing point, which could hamper total replacement of Jet-A that stays liquid at cold extremes and high altitudes. Blending with normal Jet-A improves thermal properties but there is also the issue of sustainable biodiesel feedstock to make the alternative viable.

In the context of diesel cycle engines some of the manufacturers like DeltaHawk are recognizing the

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The biodiesel in question was derived from animal fats and soy blend to create a fuel with the same characteristics as diesel.



The Benefits of Diesel Power

The economies in respect of fuel consumption and cost reduction are some of the obvious benefits of using diesel. Some notable advantages of using diesel engines include:

→ The abundance of diesel allows access to aircraft and potential aviation related services in parts of the world where avgas is either unobtainable or prohibitively expensive.

→ Low flammability of diesel makes it a much safer fuel than avgas.

→ Fuel efficiencies specifically measured at the brake specific fuel consumption BSFC can be significantly less than high octane consumption rates. For instance DeltaHawk diesel cycle engines have a BSFC of .35 ib/hp/hr compared with an avgas powered engine book BSFC of .59lb/hp/hour. (Source: DeltaHawk website)

→ The absence of magnetos and electrical ignition systems overcomes any electromagnetic interference that could affect navigational avionics.

→ There are no special starting procedures for either hot or cold engines. This is in contrast to contemporary Cessna fuel-injected avgas engines, which pilots sometimes find difficult to start after brief, hot shut downs on warm days.

→ The simplicity of operating diesel power is achieved through a single lever. There are no fuel mixture or carburetor heat controls requiring the pilot's attention.

→ The general reliability of diesel engines as intrinsic to their robust design and absence of electrical systems.

emergence of biodiesel and are also rating their engines to use such fuels in addition to Jet-A and normal diesel.

The diesel cycle engine will grind through the development mill as demand for inexpensive engine options rises to offset the increasing costs of avgas. Diesel engines offer a great deal of promise, but the existing GA fleets in countries where avgas is plentiful and relatively affordable will hinder its passage into mainstream pleasure

News Briefs

Virgin Becomes Round the World Carrier

Australia... Virgin Atlantic is trumpeting its new global group of airlines with around the world reach. The latest addition to the Virgin stable Virgin Blue's new long-haul arm, V Australia, launched operations on 27 February, forming the final piece of Virgin's global network. Virgin Atlantic president Sir Richard Branson is currently flying around the world in eight days to promote the new service.

Airlines falling under the banner are: Virgin Atlantic, Virgin Blue, Pacific Blue, Polynesian Blue, V Australia and Virgin America. The group is planning to introduce two new around-the-world fares, named Virgin Global East and Virgin Global West in April. The carriers will exploit their unity by programs such as communal frequent-flyer cards.

Business Traffic Falls Sharply

Geneva... High earning traffic on airlines fell by 13.3% in December compared to the same period in 2007, according to the International Air Transport Association (IATA).

The latest decline follows an 11.5% drop in premium traffic in November, compared to the same month in 2007. IATA says the "precipitous fall has been driven by the abrupt decline in business activity and international trade across the world."

According to the industry organization, airlines are now facing a \$15bn loss thanks to the slump in premium traffic.

flying.

The initial markets for such emergent engine technologies may lie beyond the borders of both the US and Europe. However, leading by example has a habit of persuading even the most steadfast of detractors. Diesel in aviation has deep roots in history and, as we know, history has a habit of repeating itself. JFR

The worst hit area was the Far East, which posted a 25.1% fall in premium traffic for the month. In contrast the North Atlantic sector showed a fall of 8.8% fall. European premium traffic fell by 16.3%.

Unhappily for the industry, IATA said the decline in premium traffic was not offset by an increase in economy travel. This also fell 5.3% in December, with North Atlantic and European markets seeing a drop in economy travel of 2-4%.

Indian Carriers Seek Foreign Investment

India... According to Air and business travel news (ABTN), the Indian government says that it may allow foreign investment to help the country's beleaguered domestic carriers. Foreign stakeholders may be allowed to invest in the sector, which looks set to post a loss of Indian rupees 80bn (\$1.6 billion) for the financial year ending March.

India's civil aviation minister Praful Patel says the government was engaged in a consultation process but could not give a time line for it. "Short of writing a check, anything which can be done in terms of policy measures, we will do."

Under current laws foreign investment in Indian carriers is prohibited, but they may have foreign portfolio and direct holdings of up to 49%. Vijay Mallya, chairman and ceo of Indian carrier Kingfisher, has asked the government to allow 25% foreign investment in India's airlines. JFR