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*From the Desk of John Armbrust...*

## **AAG Adjusts Surveys - Announces London Executive Session and Awards Dinner**

For the past 14 years Armbrust Aviation Group (AAG) has surveyed the aviation fuel industry to recognize the *Best Jet Fuel Marketers* and *Best Airline Fuel Departments*. For many companies, the survey provides a benchmark to judge annual improvements in 17 service categories. Additionally, surveys respondents offered opinions on various issues including - relationships, pricing, supply fundamentals, infrastructure, competition, finance and credit.

AAG remains committed to its annual surveys but also understands the difficulties impacting our industry. Many airlines and suppliers expressed frustration over the lack of time in being able to respond to the survey in

the detail requested. We thank the people who did respond but do not believe the sampling is large enough to accurately assess the overall industry.

Therefore, we are suspending the broad spectrum of questions and instead are seeking nominations of companies and individuals that have created real value or developed timely solutions during this difficult and challenging period.

We are looking for companies or individuals who have worked with airline customers or jet fuel suppliers to provide solutions during the last 12 months of extreme volatility when oil prices rose and fell over \$100 pr barrel, when credit terms were reviewed and,

*(Continued on page 2)*

*ARN Conference Opening Remarks...*

## **Leadership and New Ideas a Successful Combination During Recessions**

The following remarks by John H. Armbrust opened the 5th Annual Airport Revenue News (ARN) Conference and Exhibition in Orlando last month.

I won't belabor the issue, which we all know is true, that these are tough, difficult times that we are all going through right now. But I think a little perspective is always in order. If you think back about 30 years, and some of us are old enough to remember those days, the last great recession that occurred between 1979 and 1981. Let me take you back a little bit about what we were dealing with at the time.

In 1979, similar to what we currently experienced, we had a housing market that was overheated,

and in '79 the housing market hit a bubble. And it collapsed. As a result, we went into a deep recession. At the time, we had the prime lending rate of about 18%; today, it's 0%, since the feds are trying to get people to borrow money. We had mortgage rates in 1980, if you could afford a home, which approached 21.5% interest. We had unemployment rates more than 12% - well above the rate today.

And yet, during that period of time, people stepped forward.

*(Continued on page 2)*

**On Thursday, September 17, 2009, AAG will host a one day AAG Jet Fuel Executive Session in London to bring together industry experts, airlines and suppliers to discuss the solutions to today's most pressing issues.**

in some instances, tightened or eliminated, and when some jet fuel suppliers left markets altogether.

Over the next several weeks, **Frances Jones** and I will contact you regarding your nominations of people or companies who should be recognized for their contributions in several service categories. These companies and individuals will potentially be honored for their stellar customer service or supportive solution strategies at an upcoming AAG Awards Dinner in London on September 17, 2009 (details below).

**AAG Jet Fuel Executive Session and Awards Dinner**

On Thursday, September 17, 2009, AAG will host a one day AAG Jet Fuel Executive Session in London to bring together industry experts, airlines and suppliers to discuss the solutions to today's most pressing issues. That same evening, the AAG

**Awards Dinner** will recognize those companies and individuals who made a difference during these troubling times.

Over the next few weeks, we will announce speakers and panels who will cover sessions devoted to:

- ◆ **Finance and Credit Terms**
- ◆ **Supply Demand Fundamentals**
- ◆ **Market Risk Protection**
- ◆ **Alternative Jet Fuels**

Please contact either Frances at [frances@armbrustaviation.com](mailto:frances@armbrustaviation.com) or myself [aag@armbrustaviation.com](mailto:aag@armbrustaviation.com) for more information. We look forward to your cooperation in helping to acknowledge pro-active members of our community and your participation in the London sessions. **JFR**

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**Leadership and New Ideas a Successful Combination During Recessions**  
*(Continued from page one)*

Companies stepped forward and made a difference. And some of these companies that stepped forward, came forward as a result of leadership, new ideas, entrepreneurial thinking, those types of tried and true business practices.

So I think it's important that we look back and we say "OK, in a similar time like this, what did business do? What did individuals do?"

In 1979, right as the bubble burst, credit markets tightened up, SONY introduced its first Walkman and its first Handicam. It also created the first floppy disk. A couple of guys, **Ben Cohen** and **Jerry Greenfield**, got together and borrowed \$12,000, mostly from family, and started an ice cream company named Ben and Jerry's. That same year, in Boston, **Louis Cane** launched Au Bon Pain now with 226 cafes throughout the world. That was

the year Toyota launched the Camry, the world's most popular car. Oh, and a couple of guys working out of their garage approached IBM, and for very little money, bought the licensing agreement to create the first computer operating system; you might have heard of them: **Paul Allen** and **Bill Gates**. They became Microsoft.

That was all during the recession of '79 through '81. Or how about in 1980, a couple of entrepreneurs opened an Applebee's in Atlanta. They now have 1,500 locations throughout the USA. That same year, Whole Foods opened its first location – and we all know the success of that story, particularly as more and more people try to get healthy. Today, Whole Foods has 270 stores in North America and the UK with 54,000 employees.

**Arthur Blank**, strangely enough, believing that the housing market would recover, opened his first Home Depot in 1980. Now they're the forth-largest retailer in the world with more than 2,000 locations. Remember that was in 1980, when the housing  
*(Continued on page 3)*



**What are we going to do to get through this period of indecision, primarily; it's a period of indecision and insecurity about our own futures and where our companies are going.**

bubble burst and mortgage rates were more than 21%. What foresight! What courage!

Then a former Atari game programmer started a company by sending a letter to a British recording company, Apple, to see if he could use its name in a new company he was launching; we all know what his name was: **Steve Jobs**.

But we're not done. Finally, in 1981, as the country began to emerge from the recession, things are starting to look good and just maybe they're starting to turn around, a couple of transplants from Buffalo, N.Y., moved to Kent, Ohio, and they were longing for Buffalo wings. They couldn't find anything like that in Kent; instead of going back to Buffalo, they decided to create their own company in an empty storeroom space near Ohio State University – it's called Buffalo Wild Wings. They now have 370 locations throughout the U.S. that was in '81.

A few others I won't go into mentioning, a couple others that some of us might regret – that was also the year MTV (Music Television) was launched, and it was also the year that the first IBM PC computer was sold in America.

So I could go on, but I think that you get the idea. So we are all sitting around this room and saying to ourselves, "What do we do now?" You can't get money, credit markets

are tight, there's a lot of indecision; maybe we just close down.

But usually what happens is you will look back, 20 years from now, and say, "Well, during that awful time, look what came out of that awful time." And a lot of it is about leadership, isn't it? At the end of the day, we all get together and we ask what are we going to do? What are we going to do to get through this period of indecision, primarily; it's a period of indecision and insecurity about our own futures and where our companies are going.

It's about leadership. So with that, it is my pleasure to introduce true leaders in the airport industry. **JFR**

## Over the Hedge

*Shuddering from the effects of falling passenger demand and a prolonged recession, airlines are still coming to terms with losses incurred as a consequence of last year's fuel hedging scramble. JFR looks at the fallout*

**Southwest managed to accrue nearly \$4 billion from its hedging portfolio since 1991, more than enough to cover its annual fuel bills and turn a profit for 69 consecutive quarters.**

**L**ike moths to a flame the airline industry as a whole flew into the fire of seasoned market speculators in an attempt to offset its crippling fuel bills last year. Oil prices during the middle of 2008 peaked to just shy of \$148 a barrel as demand outstripped supply. Analysts were certain that a barrel price tag of \$200 was just around the corner. The prediction carved in granite frayed the nerves of already jittery airline management teams, helplessly watching their profit meters going into the red.

But there was hope in the form

of a precedent set by one US carrier, Southwest Airlines. Through prudent hedging it successfully financed almost 70% of its fuel overheads during 2008 at \$51 as opposed to \$147 a barrel. Many other carriers hastily followed suit, betting against the rising price of oil to elicit similar gains.

Jet fuel accounts for a major slice of operational costs for most airlines hence the need to minimize punitive overheads. Southwest managed to accrue nearly \$4 billion from its hedging portfolio since 1991,

*(Continued on page 4)*



**United Airlines and US Airways Group between them have absorbed so called paper ‘losses’ in the order of \$2 billion dollars due to over valued hedging portfolios.**

more than enough to cover its annual fuel bills and turn a profit for 69 consecutive quarters.

Hedges consist of traded derivatives used by companies to lock in a fuel price, thereby shielding airlines from fuel price volatility. The risk of hedge-related losses depends upon the hedge itself (collar, swaps or call options) and the derivative an airline uses as well as the obligations built into the hedging contract. Jet fuel contracts do not exist, so typically the bets are placed upon traded commodities like crude oil and refined heating oil. An airline might purchase a ‘call option’, giving it the right, but not the obligation, to buy a commodity at a predetermined price.

But if the spot price for that derivative price falls below that predetermined price, there is the prospect of the hedge becoming worthless. With the landslide fall in oil prices by as much as 70% many hedging commitments turned into liabilities as airlines were forced to pay their penalties taking their fuel costs above the market rate.

Before the hedging debacle took root, city analysts chastened those carriers refraining from hedging their fuel costs to head off avoidable profit warnings. However, nobody could have predicted the looming financial crisis about to take centre stage, as the foundations of the credit market sank under the tremendous weight of toxic debt.

**Post Traumatic Hedge Disorder**

The domino effect was aptly demonstrated by the way many airlines succumbed to the bug of insuring against bruising fuel spikes thought of as inevitable. The last quarter of 2008 exposed the debt-ridden balance sheets of major financial institutions, which set about a chain reaction of events resulting in the current financial gloom. Oil prices fell as demand for manufacturing goods and related commodities suffered and rattled consumers reigned in spending. Despite attempts to stabilize nose diving markets through the injection of stimulus capital by central banks, the slide into global recession was rapid

and slippery.

Although widely welcomed by commercial carriers, the falling price of oil received a tepid reception from those airlines counting the cost of their expensive and ill conceived fuel hedging deals. The prospect of cheaper spot market prices for oil related commodities undermined many a future contract price leaving airlines trying to swallow huge accounting losses towards the end of 2008. The write-downs, however, continue into 2009 since the hedging contracts are purchased months in advance, before their full effects are felt at the time of maturity. The degree of losses is dependent on the spot price, which given current price rates of \$40-\$45 a barrel, will invariably be lower than the locked in fuel price.

United Airlines and US Airways Group between them have absorbed so called paper ‘losses’ in the order of \$2 billion dollars due to over valued hedging portfolios. Even the seemingly invincible Southwest took a hit in the magnitude of \$247 million, the company’s first loss since 1991.

AMR Corp, the parent of American Airlines, posted at the close of 2008 that it had set aside \$550m to cover loss making hedging contracts. However AA was the only carrier to post a profit by the end of 2008 due to the proceeds from a sale of a subsidiary which mitigated the losses from its hedging portfolio.

Continental, JetBlue and Air Alaska have suffered first degree burns from both fuel hedging and an uncertain economy. In each case the staggering 75% drop in oil prices has transformed their fuel hedging portfolios into liabilities. Continental has endured a one time loss of \$125m from fuel hedging to date, with possible losses in 2009.

Delta Airlines’ reversal of fortune occurred when it expanded to serve international markets, but falling passenger load factors and a last minute fuel hedging has eroded its first quarter results. The hedging penalties are expected to continue into second quarter of 2009, but Ed Bastian, Delta President, is bullish about the prospects of the company beyond second half

*(Continued on page 5)*

**Hong Kong’s flagship carrier Cathay Pacific warned the investment community early in 2009 of higher than expected losses due to its fuel hedging activities.**



**If Brent crude remains at an average of \$45 a barrel then the carrier would incur \$1.4bn losses over a four year period as contracts come to fruition.**

2009: ‘We’re expecting this year to be a profitable year,’ he said.

Delta appears to be pinning its hopes on merger synergies and savings from the tie up with Northwest Airlines and the end of its hedging contracts.

**Asia Pacific Woes**

Hong Kong’s flagship carrier Cathay Pacific warned the investment community early in 2009 of higher than expected losses due to its fuel hedging activities. Earlier this month Cathay posted its first loss in ten years, partly due to wrong way fuel betting and other factors attributable to recessionary effects, such as falling passenger demand.

The company’s hedging exposure towards the end of 2008 dented profits to the tune of HK\$7.6bn (\$980m). With contracts reaching maturity for 2009, the paper losses accrued to the end of February amounted to HK\$1.9bn as reported by the carrier. “The airline expects an extremely challenging year in 2009,” said chairman **Christopher Pratt**.

If Brent crude remains at an average of \$45 a barrel then the carrier would incur \$1.4bn losses over a four year period as contracts come to fruition. If on the other hand average prices rise to \$75 then Cathay would face no further penalties from its hedges and possibly be able to cover some of its loss making provisions for 2009. “The aviation industry is in crisis,” said Pratt. “We cannot say how and when things may get better. Our assumption at this stage is that demand and yield will continue to slide in the coming months.”

In a bid to weather the recession, Cathay has already reduced capacity, grounded flights, and delayed the construction of a cargo terminal. The knock on effects of fuel hedging and the marked drop in cargo and passenger demand has forced the carrier to take the drastic step of implementing unpaid leave for staff as opposed to entertaining job cuts.

Staying in Asia, the combination of fuel hedging, negative currency fluctuations and weakening demand has adversely impacted low cost and established airlines. No-frills

AirAsia took a one off hit of \$113m to extricate itself from a toxic hedging portfolio. The move effectively overcomes the risk of the airline paying triple the cost of its long term hedges.

‘We won't have a noose around our necks going forward over this year" said **Tony Fernandes**, CEO. However, despite having its winglets clipped, the airline intends to pursue a more cautionary hedging strategy in 2010.

Malaysian Airlines and Thai Airways have also been stung by fuel hedging. The former has resorted to imposing a fuel surcharge to cover its \$100 a barrel fuel hedge portfolio intended to finance a staggering 64% of its 2009 fuel needs. Thai Airways has suffered as well, generating its first loss as a consequence of intensive hedging activities.

Finally, the national flag carrier Air China is scaling back its fuel hedging positions for 2009 amid anticipated huge losses stemming from its futures contracts.

**Bucking the Trend**

Surprisingly one airline emerged unscathed from the 2008 hedge rush - European domestic carrier Czech airlines. The airline posted a reasonable profit increase for 2008 this despite adverse trading conditions afflicting the entire industry. It attributed its positive results from astute hedging in both fuel and currency exchanges that served to decrease its overall fuel bills.

“Without this hedging of fuel and the exchange rates of the euro/dollar and the crown, the impact on Czech Airlines’ financial result would have been another 1.2 billion crowns higher,” said Czech Airlines’ vice-president for finance, **Luboš Černý**.

**Hedging Falls Out of Favor for 2009?**

From the oil price highs of 2008 to the slump in demand in 2009, carriers the world over are bracing themselves for another tough trading year with the expectation that 2010

*(Continued on page 6)*

**“Without this hedging of fuel and the exchange rates of the euro/dollar and the crown, the impact on Czech Airlines’ financial result would have been another 1.2 billion crowns higher,” said Czech Airlines’ vice-president for finance, Luboš Černý.**



**“We've got really good caps in place at good levels through 2012 especially so actually falling prices are a great opportunity for us and certainly not a problem.”**

will be no better. Passenger demand has tapered off dramatically with international travel particularly hardest hit.

The carriers have pursued measures such as capacity reduction and unprofitable route closures in an attempt to halt the inexorable slide of load factors. Cathay, United Airlines, American, British Airways, Delta and Lufthansa have all trimmed back on capacity, especially on international routes.

There is also the problem of raising capital with ailing banks and other institutions keeping a tighter grip on lending. The lack of credit delays the delivery of new aircraft, undermining the outlook for production at jet makers Airbus and Boeing, and smaller producers such as Embraer and Bombardier. Further job cuts, mergers, salary falls, and dipping into abundant cash reserves will be necessary for 2009 to ensure survival.

The fall in oil prices perhaps may have softened the blow of fuel hedging dependent on the extent to which each carrier has hedged its fuel requirements for 2009. So although fuel hedging is down, it is not out for the count. Airlines are re-evaluating their hedging strategies with many looking at reducing their portfolio risk in the wake of depressed fuel prices. Southwest is ‘de-hedging’ but it’s not out of the betting derivatives business just yet, merely biding time until the industry picks up.

Southwest’s CEO **Gary Kelly** says: “We will need to manage our hedge portfolio, and I think in times of falling prices like this, it's better to be lighter with the hedge as opposed to heavier and our folks are doing a great job of managing that. We've got really good caps in place at good levels through 2012 especially so actually falling prices are a great opportunity for us and certainly not a problem.”

The hedged fuel requirements progressively drop until 2012 for Southwest when most of its contracts expire. This suggests that the airline is opting to pay market prices, lessening its reliance on hedging that is presently unable to provision low cost fuel.

Other carriers such as British

Airways, Lufthansa and Ryanair have adjusted their hedging tactics to create leaner if not near defunct portfolios. Some airlines are trying to take advantage of the sharp decline in oil prices to lock in lower costs for the long-term. For example, Gulf Air was fully exposed to the high oil prices of 2008 as a consequence of no hedging. The carrier has now established a hedging position and time will tell if such a late entrant will reap the benefit of protracted lower oil prices.

Another important factor making hedging difficult is the lack of credit due to the absence of counterparties offering hedging contracts. The demise of investment bank Lehman Brothers left many airline customers reeling. Presently there exist very few institutions willing to offer future commodity trading options to airlines that are actively de-hedging. However Bank of America through its acquired Merrill Lynch could be filling the void.

Fuel hedging may be dormant for now, however there is an unshakeable belief that once the economic outlook improves oil prices will bounce back to record highs. Given the traditional greater premiums of jet fuel over spot market crude oil prices, fuel hedging will once again find many suitors trying to limit their exposure to stinging fuel costs. Those moths are learning their lesson. **JFR**

**Another important factor making hedging difficult is the lack of credit due to the absence of counterparties offering hedging contracts.**



Airports...

# Stimulating Experience

*Following a new law that could impact US aviation in a big way, we look at the heads up on things to come*

About 3,400 US airports are eligible for assistance via the Act of 2009, which requires that funds be obligated within a year.

The American Recovery and Reinvestment Act of 2009 (the "Act") signed into law on 17<sup>th</sup> February provides significant new incentives and extends certain existing incentives for investments in renewable energy. These incentives include US Treasury grants to reimburse taxpayers for the expense of many types of renewable energy facilities. About 3,400 US airports are eligible for assistance via the Act of 2009, which requires that funds be obligated within a year.

The \$787 billion stimulus plan aimed at kick-starting the ailing US economy includes \$200 million for air traffic control (ATC) updates and upgrades. A quarter of the money will be used to upgrade FAA power systems, while half will improve aging en-route ATC centers.

Eighty million must go to replacing towers, while \$20 million is to be spent on lighting, navigation and landing equipment. There is a further \$1bn to go towards security. The first US airports receive their funds have been named by the Homeland Security Department. They are: Anchorage, Atlanta, Columbus and Dayton (Ohio), Honolulu, Huntsville (Alabama) and Jackson Hole, Wyoming, Maui, New Orleans, Orange County (California), Orlando, Philadelphia, Portland (Maine), Sacramento, San Francisco, and San Jose (California) and Tallahassee, Florida.

Pittsburgh International airport will also receive \$10 million from the package to repair one of four commercial runways, Runway 14-32. The project includes grading, paving, marking signs and lighting upgrades. Its neighbor Allegheny County airport will receive \$2 million to renovate a taxiway. More airport funding will appear soon, since half of the \$1.1 billion allocated to the Airport Improvement Program (AIP) must be assigned by 17 June. In addition to AIP funding, the act set aside \$1 billion for the purchase and installation of airport baggage-screening and checkpoint security equipment.

Whilst the stimulus act holds the promise of many benefits for airports and operators alike, **President Barack Obama's** aviation emission strategy remains unclear.

Part of his campaign promises included the creation of a cap-and-trade system to reduce carbon pollution.



His goal is an 80% reduction in greenhouse gas emissions by 2050. A cap-and-trade scheme does not necessarily translate to a unilateral emissions trading scheme (ETS) similar to the one that is under construction in Europe.

President Obama is also gearing up to sign the bill into law for FAA funding to continue after the current bill expires on 31 March. This will see the FAA through September, since Congress has not passed a multi-year FAA reauthorization since 2007. One of the issues preventing long term funding is wrangling over the \$25 user fee proposed to charge business and general aviation operators to fund the NextGen ATC system. The American Association of Airport Executives (AAAE) is calling for further funds to be allocated to the AIP and an increase in the current maximum Passenger Facility Charge (PFC) of \$4.5. "Our hope is that this will give lawmakers time to focus on a multi-year reauthorization bill that boosts AIP funding, raises the PFC cap to \$7.5 and indexes that to guarantee \$10 billion in loans for the construction of renewable energy systems and electric transmission systems that reach financial close by September 30, 2012. It remains to be seen how this will impact our industry, but we'll keep you posted. **JFR**

A cap-and-trade scheme does not necessarily translate to a unilateral emissions trading scheme (ETS) similar to the one that is under construction in Europe.



*NFR Interview...*  
**General Electric Aviation: Powering a Green Future**

*The leading aero-engine maker believes that innovation in both engine technology and bio-fuels will help sustain the future of commercial aviation*



*In our ongoing effort to cover important aspects of the aviation industry, AAG has launched a new publication, New Fuels Report (NFR) that will cover the growth in alternative jet fuels. When warranted, the AAG Daily Briefing will highlight significant developments in this section and the Jet Fuel Report (JFR) will include a supplemental that will cover important developments in detail. Please contact AAG for additional information on NFR or if you would like to highlight your company's developments in the NFR daily segment or the monthly supplemental.*

**G**eneral Electric Aviation one of the world's most accomplished gas turbine manufacturers has just tested its latest fuel efficient and low emission engine, the GENx-2B. Destined for Boeing's new 747-8 airframe, the powerplant is a product of the company's 'Ecomagination' representing its commitment to developing technologies that enhance both environmental and operating performance.

General Electric partnered with French maker Snecma (part of the SAFRAN group) to create the joint venture entity CFM International. GE is contributing to the development of CFMI's new Leap X engine, promising even lower emissions and unrivaled fuel economies.

Jet Fuel Report had the opportunity to speak with General Electric's **Mike Epstein**, leader of alternative fuels to get an insight into GE's involvement in bio-fuel developments and the company's environmentally friendly outlook.



**JFR:** How does GE view the practical provision of readily available biofuel alternatives in sufficient volume to service air transport needs on a commercial basis?

**Epstein:** First, let's put a few numbers on the table. Aviation consumes about 70 billion gallons per year of jet fuel globally. This is about 10% of distillate fuels used in the transportation sector and accounts for roughly 2-3% of greenhouse gas emissions. One thing I'm always amazed by is the number and quality of new ideas and concepts being proposed to address the energy needs of aviation. These are not boring re-runs from the oil shocks of the 70's. Many of these

concepts have the capability to produce billions of gallons of aviation fuel in ten years or less. Likely, you'll see regional solutions develop, depending on regional resources and conditions. One challenge we will face as an industry is to assure that we use these resources in a responsible manner and ensure that introduction of these alternatives occurs in an orderly, "uneventful" manner.

**JFR:** Suppose we have a certified second generation drop in fuel, how can we create a market for such a fuel? Are there any limiting factors to implementation and acceptance?

**Epstein:** I do not want to speak for fuel producers or potential biofuel manufacturers, but it is my observation that there are several barriers that need to be addressed. Biofuels start with a commodity derived from an agricultural market and are subject to the price fluctuations of that world. Even if the feedstock is not food based and doesn't displace food acreage, the starting point is still an agri-commodity. The wild price swings we saw in petroleum in 2008 were mirrored in the commodities markets. Building a business plan around these sorts of price swings would challenge the best of the best.

Another consideration that we need to face regards tax and other government policy incentives. Many biofuel and renewable concepts are break-even activities at present, so the profit and therefore the business motivation ends up being dependent on the level of tax or other incentives available. The more stable and long-term those benefits are, the more likely you will see green industries and green jobs being created.

**JFR:** What is GE's view concerning the arguments raised by green lobbyists that bio-fuel production is not as carbon neutral given its

*(Continued on page 9)*

**The wild price swings we saw in petroleum in 2008 were mirrored in the commodities markets.**



**We do not see a need or requirement to modify our hardware or software to accommodate use of these fuels.**

**Bear in mind that environmental impacts are very important, but assured supply and price stability are also factors to consider.**

energy requirements and emissions on production?

**Epstein:** We - and our customers - take the concerns of environmental groups very seriously. It is our expectation that academia, industry, NGO's, and government will work together to advance the state of the art in so called "Life Cycle Analyses." These are technical studies designed to account for the full environmental effects of the production, manufacture and use of a fuel - conventional or alternative. It goes beyond carbon dioxide, which is important, to include other issues related to land use, harvesting and/or mining. There are also indirect impacts, such as the potential social and political, implications. We also hope that, as these studies advance, a certain level of standardization will accrue so one study can reasonably be compared to the next. It's important to know, in a quantitative and a qualitative sense, whether a proposed alternative fuel will really provide a measurable, meaningful benefit from where we are today so the quicker we advance these types of analyses the better.

**JFR:** Are you planning any more bio-fuel flights during 2009/10? Do you have any further agreements with airline partners apart from Continental and Virgin?

**Epstein:** Yes! I am happy to share that CFMI has just signed a Memorandum of Interest with Interjet in Mexico and Airbus to test a biofuel blend that will be produced by Global Seawater and UOP. Interjet is a great airline and we are delighted to be collaborating with all of our partners on this project, each of whom brings an important perspective and capability to the team.

Beyond this announcement, GE and CFMI continue to look at opportunities, which will advance the state of the art, move the industry forward, and build relationships. This also includes working with our military customers who are also expressing a strong interest in testing and qualifying biofuel blends for their aircraft.

**JFR:** Certification of bio-fuel is predicted for 2010. Does this certification involve the chemical

makeup of a biofuel, specifying its performance characteristics, such as energy density and exposure, to temperature extremes with a view to making it indistinguishable from normal Jet-A?

**Epstein:** Yes, exactly. There is a roadmap and corresponding plans in place to certify up to 50-50 blends of biofuels derived from plant and other renewable oils. The body of technical data on these feedstocks is becoming quite large and it appears that they are similar in chemical composition and performance properties to Fischer Tropsch (F-T) derived blends. Inclusion of these bio blends in the fuel specifications and approval for use by the aircraft and engine OEMs is currently targeted for the end of 2010.

**JFR:** So certification would not specify the feedstock used if the same performance is yielded through using jatropha, camelina or algae for instance?

**Epstein:** Concerning feedstock independence, thus far the available data has shown that plant oils - triglycerides - processed via hydro treating, selective cracking, and upgrading methods yield a fraction of Jet-A / kerosene equivalent that is independent of feedstock. What can vary is the amount of Jet-A versus the amount of renewable diesel and naphtha residuals that is produced from a given feedstock such as jatropha, algae, and babassu. The triglycerides vary from different feedstocks so the fraction of equivalent Jet-A can vary as well. Also bio fuel lubricity is less than Jet-A and the density can be off by 1-2% but this can be resolved through additives for increasing lubricity and technology to up the density.

**JFR:** Have you determined any significant effects on the components of test rig engines used, such as on the combustors and the material stresses or failure points if any exist?

**Epstein:** Our testing to date with GE and CFMI engines has shown no meaningful difference between conventional fossil derived Jet-A and 50-50 blends of biofuel, so called HRJ (Hydrotreated Renewable Jet.). These

*(Continued on page 10)*



**The expectation is that up to 50-50 blends of Fischer Tropsch fuels will be commercially certified for unrestricted use in mid to late 2009.**

fuels, at up to a 50-50 blend, are truly drop in. We do not see a need or requirement to modify our hardware or software to accommodate use of these fuels.

**JFR:** Fischer Tropsch fuels have found favor with the US Air Force. Being hydrocarbon based is there still an issue with emissions?

**Epstein:** There are many dimensions associated with a fuel supply chain. Fischer Tropsch derived fuels can be produced via any carbonaceous feedstock such as coal, natural gas, or renewable, low grade cellulosic waste. In practice, there is a large coal derived plant in South Africa, and natural gas to liquid plants in Malaysia and Qatar. No question, those plants have issues associated with CO2. Generally, the numbers associated with coal derived F-T is around 1.8 times CO2 emissions versus conventional petroleum, and natural gas derived F-T is quoted anywhere from a slight greenhouse gas benefit to a slight negative impact.

Bear in mind that environmental impacts are very important, but assured supply and price stability are also factors to consider. Our military customers and some of our commercial customers recognize that each of these issues bear weight, and so are pursuing both renewable and non-renewable options. There is sophistication to a diversity-of-supply approach that should not be underestimated.

**JFR:** If successful with the US military will FT type fuels make it into commercial civilian fleets?

**Epstein:** In the US, ASTM (The American Society for Testing Materials) has stewardship over the aviation fuel specifications in coordination with the commercial certifying bodies, engine and aircraft OEMs, fuel producers, etc. The expectation is that up to 50-50 blends of Fischer Tropsch fuels will be commercially certified for unrestricted use in mid to late 2009. As a result, any airline will be able to purchase and use these fuels at their discretion. I have seen press reports that have described negotiations with several airlines and F-T producers to provide these fuels once approval has been

granted.

**JFR:** Do GE and Snecma and hence CFM overall have any joint programs in the arena of bio-fuel/ FT fuel developments/ testing given the synergies that could exist as a consequence of the close partnership? Is it possible to have a demonstrator engine plugged into a plane for flights during trade airshows like Farnborough or Paris in the future?

**Epstein:** Wow... great question...have you been bugging our phone lines? Seriously, CFMI and our parent companies GE and SAFRAN are evaluating a full spectrum of options on how we can work together, and how we can work with others via government and industry sponsored forums and organizations. I would expect that much as the relationship between GE and SAFRAN has grown over time via CFMI we will find new and meaningful ways to work together on this complex, important issue.

**JFR:** It appears that bio-fuels will play a significant role in maintaining growth and expansion in commercial aviation. In 20 years what will the industry look like? Will planes be flying with locally produced bio-fuels blended with Jet-A or will there be a 3rd generation or 4th generation fuel which completely replaces traditional fossil based fuels?

**Epstein:** My vision is that 20 years from now aviation will be a much greener activity. It's not just about biofuels, but a whole range of technologies and emerging strategies to lower our footprint. This includes airport management – using the most efficient and cleanest energy sources on the ground, minimizing taxi and takeoff hold time, purchasing zero emission ground vehicles.

It also includes optimized air traffic control – already being operationally tested at a few airports around the world, some of the fuel savings quoted are impressive. I expect that this will be the standard in 20 years.

**JFR:** You mean like NextGen satellite based ADS-B traffic control measures?

**Epstein:** Yes exactly that. We're working on the next generation

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**It's not just about biofuels, but a whole range of technologies and emerging strategies to lower our footprint.**





**"Individual countries or regions acting in isolation cannot resolve what essentially is a global phenomenon."**

solution to address aviation's carbon dioxide emissions. AEA secretary general, **Ulrich Schulte-Strathaus** suggests that the industry "thinks outside the box".

He points out that we live in a united world. "Individual countries or regions acting in isolation cannot resolve what essentially is a global phenomenon. We believe we have a proposal which is pragmatic and practical, and hopefully acceptable to all stakeholders," says Schulte-Strathaus. He was talking about Europe's introduction of a carbon-trading scheme from 2012 onwards, which it estimates that that will cost the airline industry \$5 billion in additional annual costs.

He said: "We, as airlines, care about the environment and want to make sure that the forthcoming Copenhagen process succeeds for our sector." AEA's concept moves to a global sector-wide approach, which adheres to the Kyoto principle of common, but differentiated, responsibility. This caters for different levels of environmental stringency.

AEA has urged the European summit heads to take into consideration the specificities of aviation when developing a post-Kyoto framework based on a carbon cap and trade system. Schulte-Strathaus said; "In our industry, we believe we have the innovative skills to reduce aviation's dependency on fossil fuels. Such a pragmatic global scheme would be an additional incentive to encourage innovation."

He also said that he had no idea where the European airline industry would be in a year from now. He added: "Traffic has been in freefall since mid 2008 both in passenger and freight. 2009 will bring the lowest growth in 30 years of passenger air transport and we expect freight, which is an effective forward predictor of economic performance, in 2010 to be even worse than 2009, with the deterioration accelerating." The AEA predicts losses of between €1.5 billion (\$2 billion) and €2.5 billion this year.

**A380 Route Withdrawal**

**UAE...** Emirates is to withdraw its Airbus A380s from the New York JFK route in a bid to shift capacity to Toronto. It will also deploy

the type to Bangkok. Emirates operates the aircraft on its Dubai-New York service, but it will revert to using Boeing 777-300ER.

The airline says the economic downturn has resulted in the need to rethink the positioning and use of the 489-seat aircraft. "As the global economy has affected international air travel, this aircraft redeployment was based solely on a change in capacity demands in these three markets," said a spokesman.

**Green Expo for Friedrichshafen**

**Friedrichshafen...** Germany's Aero Friedrichshafen Show taking place on 2-5 April is to organize an e-flight-expo for the first time. There will be three themes, all with a common denominator – the ecologically oriented future of aviation. They broadly encompass: aircraft with electrical engines, solar charged batteries for less expensive costs per hour, fewer emissions with no exhaust fumes and almost no noise and smaller risks for pilots. The conference will also look at carrying no fuel on board, which is particularly interesting for paramotor pilots.

Aircraft on display will include: e-paragliders, e-sailplanes, e-fixed-wings including two seaters for flight instruction. Future solar technologies and new photovoltaics, solar cells, eg lacquer, foils, textile cooperations with research institutes and universities and private and public business. High-end battery manufacturers of new super batteries for e-flight will also have a presence.

The e-flight-expo 2009 will also host the first e-flight award ceremony. The e-flight award will go to the most innovative e-flight project.

Three hydrogen fuel cell airplanes will be on display, including the French ultralight fuel cell trike flying during the daily air shows. The trike made by Helite is a world première: the lightweight manned aircraft is solely powered by a fuel cell without battery support.

Readers may also be interested in the upcoming Airline Information emissions trading scheme conference coming up on 1-2 June in London, UK. **JFR**

**"In our industry, we believe we have the innovative skills to reduce aviation's dependency on fossil fuels."**

