TESTIMONY TO THE HOUSE TRANSPORTATION COMMITTEE

AVIATION SUBCOMMITTEE

HEARING ON AVIATION AND THE ENVIRONMENT: EMISSIONS

Richard L. Altman

Executive Director,
Commercial Aviation Alternative Fuels Initiative (CAAFI)

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Thank you Mr. Chairman and members of the subcommittee for providing the Commercial Aviation Alternative Fuels Initiative with the opportunity to testify on the compelling issues of Aviation and the Environment: Emissions.

Mr. Chairman thank you as well for acknowledging Aviation's efforts in alternative fuels in particular. In your April 8 Op-ed for "The Hill" you stated that "the (aviation industry) is leading the way in research on alternative fuels. Besides the positive impact on the bottom line, there are obvious positive environmental impacts from these efforts, with lessons for the rest of the country". It is particularly gratifying to us in the Aviation sector that our positive efforts are being recognized including, but not limited to, the efforts of the CAAFI collaboration. CAAFI is solely an instrument that Commercial Aviation is using to bring together the full scope of subjects needed to speed the introduction of alternative fuels. In testifying today as a representative of the CAAFI my goal is to provide new information to the committee on our progress since we last spoke to you one year ago. With progress there also comes added insight to the challenges that are being faced. Those will be addressed as well.

For those not familiar with CAAFI, the Commercial Aviation Alternative Fuels Initiative is a data gathering and communications collaboration that seeks to

increase both the quantity and the quality of dialogue among its Airline, Airport, Manufacturer and FAA sponsors and between sponsors and the numerous stakeholders that are engaged with us. CAAFI engages multiple government, industry and university contributors. Over 20 Energy suppliers are now stakeholders in CAAFI. We are global in reach with multiple stakeholders on four contents. The fundamental belief of the sponsors in forming the CAAFI collaboration is that the aviation industry is data driven and relatively small in size allowing it to benefit from such an approach. CAAFI's sponsors and stakeholders recognize that data they develop and collect needs to be placed in the hands of key analysts and decision makers. In such matters as safety, security, and the environment such analysis will be a catalyst for informed and expedited solutions that serves all components of the supply chain well. Uniform understanding of solutions and clarity of message, it is believed, will spur suppliers to invest in solutions suitable for Commercial Aviation. The goal is to make our relatively small sector of transportation a "customer of choice" for introducing alternative fuels.

With this goal in mind this testimony focuses on two areas. First, progress we have been made in each of CAAFI's four functional areas (Certification, R&D, Environmental and Business/Economics) since we met last year with the committee will be laid out. Second, the main challenges that we face to strengthen and continue our leadership roles in alternative fuels will be highlighted.

As indicated last year the input provided is very much a snapshot of unfolding events. New results arrive and new ideas are conceived almost daily in this rapidly developing area – just as fuel price went up $10 per barrel crude since you authored the Op-ed piece on April 8.

The first four months of 2008 have seen an unprecedented level of activity in the Certification and R&D developments globally. Obviously there are many

headline developments you cited in your comments on highly visible Flight programs. Those occurred both at Boeing and at Airbus. Many more are planned.

Most important, in my view, is the spadework being done in three areas. These efforts do not typically draw headlines but will result in turning these headlines into actual fuel production that will affect both producers and users. Accordingly this testimony addresses the efforts of CAAFI teams seeking to

- Execute R&D and certify new fuels
- Define their environmental benefits and costs of these fuels as well as to establish tools to ease the assessment of the benefits of introducing these fuels to new location using a full life cycle (well to wake analysis).
- Establish efforts to facilitate dialogue between new suppliers and buyers to ensure that the needed discussions take place. This dialogue is critical to ensure potential investors that projects that supply alternative fuels via the unique airport fuel distribution infrastructure will find ready buyers.

Last year CAAFI identified broad time frames when key R&D and certification events would occur. That promise is becoming reality with several truly key developments having occurred in the last few months.

On April 11 the Air Force Certification Office approved a new JP8 Mil Spec (8133) embracing 50/50 blends of Synthetic Paraffinic Kerosene (SPK) from all forms of feed stocks including coal (CTL), gas (GTL), and biomass (BTL). This qualification is the first critical break from the long-term certification approach which qualified fuels on an individual producer/individual fuel basis. This "generic approval" does much to strengthen the opportunities for new Suppliers.

In February the CAAFI Certification and Qualification team was a driving force behind the submittal of a ballot to the ASTM proposing a modification to the fuel specification ASTM D-1655 to include 50/50 SPK based blends. In a meeting

just last week in Alexandria, VA the team mapped out its plans to achieve a positive outcome that is expected to parallel the Air Force process and targets completion by yearend.

Taken together these developments form critical signposts to investors in synthetic jet fuel plants. Aviation fuels can comprise up to 70% of the output from plants like those in the planning stages for construction Illinois and Ohio by Rentech, American Clean Coal Fuels and BAARD Energy. If initial approvals for these projects are granted this year, construction can start early next year and initial production is possible in the 2012 time period.

Promising developments do not stop there. Also in April the UK certification panel provided its approval (via DefStan 9191) for 100% Sasol CTL from Sasol's South African facility. That approval marks a notable success for the Engine manufacturers GE, Honeywell, Pratt & Whitney and Rolls Royce as well as Sasol. Together they were able to run all tests required by a new set of engine company protocols and become certified in about 3 years time. Certification was achieved less than 15 months after the completion of the last test at P&W in January 2007. This is a great sign that we will be able to achieve CAAFI's goal of approving 100% FT fuel by year end 2010. It should signal to the investment community that time to certification is no longer a barrier to investment. CAAFI's R&D and Certification teams are working together to achieve longer term goals of approving sustainable aviation biofuels from sources that may prove to be less capital intensive in the long term. One such process involves fuels from Hydrogenated Plant Oils .

Recognizing that just having a goal of 2013 for sustainable aviation biofuel certification is not nearly enough to realize the CAAFI's goals, its certification and R&D team leaders are working with the Air Force to formulate a joint roadmap co-owned by CAAFI and the Air Force to achieve full certification of new

sustainable aviation biofuels identified through the soon to be completed Defense Advance Research Project Agency (DARPA) program..

Ultimately fuel from algae may have the greatest yield of all energy crops, as much as 100 times the yield of current biofuel crops. DARPA and Algae Fuel interests are working closely with industry to launch new projects to head down the road of researching and subsequent commercialization of this promising source.

While Certification of Fuels is a pre-requisite to enabling alternative fuel use in aviation, such alternatives must pass the test of providing significant environmental gains. CAAFI's environmental team has several initiatives launched through the FAA Office of Environment and Energy and the Transportation Research Board's Airport Cooperative Research Program (ACRP) designed to achieve this end. Several key milestones have been met on those projects over the last year. Taken together they place aviation in a position not only of achieving environmental gains but of documenting those gains in ways that are quantifiable. CAAFI is dedicated to making these approaches acceptable to all stakeholders willing to provide input to and consider data based analysis.

The MIT led Partnership for AiR Transportation Noise and Emissions Reduction (PARTNER) Center of Excellence's precedent setting "Well to Wake" environmental life cycle model provides CO2 outputs for over a dozen candidate fuel types. The first phase of the FAA funded project is complete. A second iteration on the study is planned and upgrades to the model to better account for Jet fuel production specifics are planned. It will use "world class" models to assess indirect land use effects in the production of aviation biofuels. Work to date using these models suggest that there are a wide range of fuel options that have the potential to outperform current oil refineries in "well to wake" greenhouse gas production.

Based upon the model and the information that has been provided by those planning the projects in Illinois and Ohio a positive outcome may include mixed coal and biomass to liquid fuel (CBTL) projects now in the planning phase. Those facilities offer the most efficient means to capture CO2 and can use it for enhanced oil recovery. Princeton researchers have indicated that for every barrel of fuel produced, two barrels of oil are obtained from enhanced oil recovery. The mixing of coal and biomass may offer significant improvements in carbon footprint compared to coal to liquid (CTL) plant and oil refineries. Analyses by Princeton and Noblis suggest that carbon neutral synfuel production with as little as 21% biomass content may be possible when by-products are fully utilized.

A key characteristic of the alternative synthetic paraffinic kerosene Alternative fuels currently being brought to market, or in the research phase, is that they are extremely low in sulfur. Sulfur is a precursor to the small soot particles (PM 2.5) that are now identified in EPA issued National Ambient Air Quality Standards (NAAQS). With over half the airports in the U.S. in identified non-attainment areas under the NAAQS use of emerging alternative fuels may be one of the best tools to control growth in PM2.5 exposure that could ultimately limit the growth of commercial aviation in the U.S.

This past week CAAFI introduced a proposal to the Coordinating Research Council (CRC) of the fuels approval agency ASTM (American Society for Materials and Testing) to study the costs and benefits of ultra low sulfur (ULS) fuel in aircraft. Initial studies from MIT show that that control of particle (PM2.5) in jet fuel via ULS fuels (including 100% SPK) could have very sizable public health benefits. Benefits can be double that of the benefits of currently mandated NOX reduction in local airport environments. The study requests the results by the end of 09' for an examination balancing health effect benefits with potential maintenance cost and perhaps to address any airworthiness concerns.

With this data in hand future approvals of pure synthetics post 2009 will be expedited. To ease new fuels introduction to airport markets CAAFI recommended a project to combine these tools via development of an Airport handbook calculation procedure. The Transportation Research Board, Airport Cooperative Research Program (ACRP) initiated that program late last year. The colorfully named project (ACRP project 02-07) is currently in its first phase surveying different sized airports to in part establish needed databases needed to create the handbook and to execute test cases of handbook use.

One economic key to beneficial introduction of alternative levels of fuels could be the degree to which Ultra low sulfur jet fuels can be used in diesel powered Ground vehicles enabled if 100% SPK fuel can meet the ULS limits now applied to diesel equipment. In airports planning growth the ability to use one, rather than two fuel types provides potential economies. In addition as those airports confronting PM2.5 non attainment could be the best place to introduce synthetics. Identification of those locations could provide an assist to fuel producers in identifying early customers.

Recognizing this, CAAFI interests proposed two new projects to ACRP last week. The first project enhances ACRP 02-07 fidelity by proposing the development of added emissions data for Ground support Equipment from a variety of alternative fuels. The second project proposes a project to prioritize airports that would benefit from the introduction of low PM2.5 fuels non-attainment areas as these areas have been identified in EPA issued National Ambient Air Quality Standards and quantifying what gains are possible.

While action is not complete on FAA Reauthorization it should be noted that the Aviation Committees actions to initiate the CLEEN program, and in the case above to make ACRP permanent and to direct a part of the project to environmental projects, are already serving to make approval of these projects

more likely.. Thanks to the Aviation Subcommittee and Transportation Committee for helping to enable these initiatives.

With certified fuel candidates available and needed environmental tools elements in hand the last key needed to launch the aviation alternative fuels in the U.S. are buyers.

The Air Force with its visible goal of 50% use of 50/50 synthetic fuels by 2016 has long been the leaders in the US in this area. As it is with R&D, Certification and Environmental efforts I am pleased to report that the commercial airline industry is now taking important steps to join the Air Force as potential early customers for Synthetic Fuels.

On April 22, Earth Day, the Air Transport Association – a CAAFI sponsor and the representative of U.S Airlines provided its policy on synthetic fuels. A link to that statement is provided in this testimony
http://www.airlines.org/economics/energy/altfuelsprinciples.htm

The comprehensive statement dedicates the U.S Airlines to work with potential future suppliers to "integrate alternative fuels into their operations". It seeks only alternative fuels that have "a reduced emissions profile relative to traditional fuels on a life cycle basis." The tools that it commits to use to demonstrate that performance are the ones being developed by CAAFI and the FAA Office of Environment and Energy and being used by the Airport Cooperative Research Project as described above.

To ensure that this process is substantive the ATA Energy Council representing the Airlines fuel suppliers and the CAAFI business/economic team now plan to bring suppliers and airline users together in a Department of Commerce hosted meeting in the September /October time period here in Washington to make the

needed introductions of a potential new supply base to an aviation industry having unique distribution and quality needs.

These recent developments are extremely important and should signal to potential suppliers and investors that given the availability of competitive business terms for fuels that meet the stated environmental criteria, and a distribution system which is compatible with transport and airport infrastructure, the airline industry is prepared to be a key component in helping to launch new projects.

I am please to advise that as well that the Supplier industry is responding to the message that aviation (both commercial and military) have implemented. In particular the parties planning projects in Illinois (Rentech and American Clean Coal Fuels) and Ohio (BAARD Energy) have indicated in public forums that they are willing to supply up to 70% of facility production to aviation. This amount is far above current Fischer Tropsch facility production volumes which average less than 30% aviation production.

Another indication that suppliers are responding to aviation's call is that increasingly aviation and CAAFI are being invited to address Energy forums regarding our plans. Just next week CAAFI will be the only transportation mode addressing the 8th GTL/XTL summit in London at the invitation of Air Force GTL supplier Shell Aviation.
In November Boeing was a co-sponsor of the first Algae summit held in San Francisco. Aviation interests from several CAAFI sponsors and suppliers were present. It was at this meeting that DARPA announced its multi-million dollar project to enable algae fuels.

With all this excellent progress, largely over the last year, the obvious question is what issues remain as gaps for CAAFI interests including the government agencies to address.

First we must acknowledge is that the current round of projects offers only a small contribution. If all the supply of the potential plants were to be available to aviation they could only supply the 80,000 barrels a day fuel needs of O'Hare airport. Second as we all know the capital needs to flow from to build plant and equipment. Consequently the projects cannot escape the issues of capital formation currently plaguing the investment community. Clearly these issues are well beyond CAAFI's area of influence. We can however ensure that solutions are available when conditions allow more investment.

For elements CAAFI working with the Administration and Congress where we can have influence there are gaps that we do need to address. A partial list includes.

One barrier to sustainable aviation biofuel introduction is the need to produce significant quantities even before the fuel can be certified. For example it is recognized that the engine industry alone (as cited publicly by DARPA) will need up to 250,000 to 500,000 gallons of biofuels from new processes (e.g. Hydrogenated vegetable Oils from their current program) to achieve certification. CAAFI and the airline industry are addressing that issue by adding USDA and the Energy Departments renewables office (EERE) as stakeholders in our process. It is our hope that recognizing the potential for renewable energy suppliers we can find solutions to work this problem. I am certain that interest and support from the Aviation committee with its associates in other Congressional committees can provide assistance.

Technically there a concern with transport of some biofuel types should they become available to airport facilities. CAAFI has rolled concerns of facility compatibility into its definition of a qualified fuel. We know that efforts are underway through such efforts as the Biomass Research and Development Initiative to explore those problems. That said airport suppliers and pipelines needs to be fully engaged to ensure that our unique needs are addressed.

Gasification of biomass while being executed globally suffers in that it has few options and presently has no domestic supplier of needed technology. With

options limited we do not have optimal technical solutions. Part of the CAAFI business team's goal is to engage its highly competent systems level-manufacturers in the pursuit of these technologies. Such companies as UTC, GE, Honeywell, and Raytheon in addition to Boeing can potentially help in that quest.

There is a significant concern that there will be adequate amounts and sufficient quantities of water – particularly in western states for the cooling of FT plants and for the production of biomass feed stocks in many areas. Solutions may involve the use of degraded (dirty, salty water). Again Aerospace OEM technologists can help solve the issues which in themselves may be profitable businesses and in the margin help their core aviation business.

Lastly we do need to do ensure that there is a complete and thorough national dialogue and mutual understanding on the quantification of environmental solutions. International harmonization of tools and solutions developed using those tools is a priority for CAAFI's FAA office of Environment and Energy sponsor. For its part CAAFI along with FAA AEE is placing the highest priority on the use of the best indirect land methods, and gasification emissions models specific to aviation in future iterations of its lifecycle analysis tools. This will to ensure the broadest possible buy-in to the outcomes being produced. We need a true international cooperative effort and are increasing our dialogue to include more international partners to approach this goal.

In closing I would like to thank you Mr. Chairman for your support of the CAAFI coalition by providing us with an opportunity to represent our sponsors before the committee.

I would also like to thank publicly the approximate 150, largely volunteer, members of the CAAFI coalition for their contributions to these efforts. For most – including our team leads this is not their "day job". I would like to thank the members of all the stakeholder government agencies from DOE, NASA, USAF, DOD, DARPA, USDA, DOC, and EPA who have crossed organizational

stovepipes to cooperate in ways I have not seen in my 41 years in working with government from the vantage of the private sector. I would especially thank Carl Burleson, Dr. Lourdes Maurice and the FAA Office of Energy and the Environment who support were first to recognize the opportunity for the CAAFI coalition and who support my function directly. Without contributions from all of those above the progress reported would not be possible and prospects for the future remote.

That concludes my prepared statement. Thank you.

5/5/08