



# New Fuels Report

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## Camelina Holds Promise As One Part Of The Growing BioFuels Basket

By David Ward



It's been a year of exciting firsts for camelina, the once-humble flax-like plant that is rapidly emerging as a potential major feedstock for biofuels.

January saw the successful test flight of a Japan Airlines' Boeing 747-300 powered by a mixture of jet fuel composed of 85% camelina, 14% jatropha and 1% algae oil. And earlier this month (August) a Boeing U-787 became the first hydroplane to be successfully driven using the same mixture during a test run in Seattle.

Camelina has been cultivated for an estimated 3,000 years, but it's only been in the last several decades that scientists have realized this oil-rich plant could be used as source for alternative fuels.

While other fuel feedstocks such as jatropha tend to grow in warm climates, such as India, South and West Africa and South East Asia, camelina is a non-food stock that thrives in more temperate regions such as Europe and much of the Western USA and Canada.

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## Fueling California

*Working For A Responsible And Efficient Energy Future*

By David Ward

Recently Fueling California, a coalition of leading transportation-centric California business, released a study illustrating how the state government's unique fuel policies – as well as its taxes structure and fees – have driven the cost of petroleum well above the national average. The study, was done by leading University of California and

California State University economists and covered by media outlets up and down the state, was largely focused on traditional gasoline, noting Californians pay 30 cents more per gallon.

But the study showed the other distillates, including jet fuel, were also impacted by the state rules taxes and regulations,

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**Armbrust Aviation Group, Inc.**

8895 N. Military Trail, Suite 201E

Palm Beach Gardens, FL 33410

Telephone: **561-355-8488**

Fax: **561-355-8188**

Website: **armbrustaviation.com**

E-mail: **info@armbrustaviation.com**

**John H. Armbrust**

Publisher

**Frances Jones**

Co-Publisher

**Liz Moscrop**

Contributing Editor

**Carol Ward**

Online Director

**Barbara Moreno**

Circulation Manager

**Roger Schinkler**

Creative Director

**Beth Hanlon**

Business Manager

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You are invited to subscribe to **New Fuels Report** (NFR), the authoritative voice and information source for the emerging alternative jet fuel market. NFR will provide you with quality, objective news coverage of the latest developments, key players and importantly, the hard facts, about the growth of new jet fuels and the impact on airlines, suppliers, airports, engine and airframe manufacturers, trucking companies, terminal and pipeline operators.

Whether due to soaring and volatile prices or the push from environmentalists and government regulators to reduce harmful emissions – the trend for new jet fuels as a replacement for fossil fuels is gaining momentum, and expanded funding from public and private investment. NFR will cut through the noise and identify solutions to help you determine what's real versus imagined.

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*(see pages 7 and 8)*

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## News Briefs

### Alternative Fuel Alliance Gets DOE Grant

**T**he Alternative Fuel Trade Alliance said it has received a \$1.6 million grant from the US Energy Department to be used in a public awareness/education campaign. The program will work with Clean Cities Coordinators in different markets to boost the understanding of both alternative fuels and advanced vehi-

cles technologies. Alliance members include the Renewable Fuels Association, the National Biodiesel Foundation, the Propane Education & Research Council, the Clean Vehicle Education Foundation and ASG Renaissance and the group lauded the goal of taking a market-by-market approach to raise alternative fuel awareness. "This DOE grant will supplement our individual and joint efforts to work with and train coor-

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## News Briefs

dinators, stakeholders, and others at the national and regional level to enhance their knowledge and expertise on the latest developments and applications for alternative fuels and advanced vehicle technologies which include ethanol, biodiesel, propane, and natural gas fuels as well as hybrid/electric technologies and idle reduction strategies to improve fuel economy," said **Bob Dineen**, President/CEO of the Renewable Fuels Association.

### Navy to Test Biofuels for Fighter Jets by Mid 2010

The US Naval Air Systems Command fuels team has announced plans to conduct tests using biofuels in F/A-18 Super Hornets within the next 12 months. **Rick Kamin**, Navy Fuels Lead, said the actual flight tests would be preceded by laboratory and rig tests at Pax River in Maryland, followed by static engine tests with the Super Hornet's F414 engine at the Lynn, Massachusetts facility of manufacturer General Electric. "Our major goal is a drop-in replacement" for the Navy's petroleum-based fuels, Kamin added in a statement. The Navy requested 40,000 gallons of JP-5 jet fuel from bio-based feedstocks for the tests, and fuels used could include oils produced by camelina, jatropha and algae, but will not come from food crops. Kamin also noted the test will use a 50-50 blend with conventional petroleum-derived jet fuel to provide the necessary specification properties.

### Rentech Scores Highly with LAX Airlines

Rentech will supply eight airlines at Los Angeles International Airport (LAX) with synthetic diesel fuel, marking a milestone for the biofuel company, which aims to increase its jet aviation fuel production capacity to commercial scale in four years. Rentech's multi-year deal is for the supply of up to 1.5

F/A-18 Super Hornets



million gallons annually of synthetic diesel for ground service equipment operations at LAX beginning in late 2012. Eight airlines – Alaska, American, Continental, Delta, Southwest, United and US Airways – signed on to buy the synthetic diesel that will be created primarily out of yard clipping and other wood waste. Rentech's major product is its synthetic aviation jet fuel, which was recently certified for commercial aviation. The company noted that all the airlines that have agreed to purchase synthetic diesel from Rentech for their ground vehicles were also potential customers for its jet fuel.

### Military Eyeing Jet Fuel From Seawater

Though still a long way from becoming a viable energy source, US Navy chemists recently announced they have processed ordinary seawater into unsaturated short-chain hydrocarbons that with further refining could be made into jet fuel. The experiments involve using a variant of a Fisher-Tropsch chain reaction that produced a gasoline-like hydrocarbon fuel from syngas, a mixture of carbon monoxide and hydrogen often derived from coal. Navy Research Laboratory chemist **Robert Dorner**, author of a paper on the technique, noted that CO<sub>2</sub> is rarely used in the Fischer-Tropsch process because of its chemical stability, but added that CO<sub>2</sub>'s abundance, combined with concerns about global warming, could make it an attractive potential feedstock at some point in the future.

Dorner and colleagues found that while using the usual cobalt-based catalyst on seawater-derived CO<sub>2</sub> produced almost entirely methane gas, switching to an iron catalyst resulted in only 30% methane being produced, with the remainder short-chain hydrocarbons that could be refined into jet fuel. The only challenge is that the complex multi-step process currently consumes significantly more energy than the fuel it produces, so the Navy is now looking for a carbon-neutral way of generating the energy needed to run the seawater-to-fuel process.

### ATA Applauds New Specifications for Synthetic Aviation Fuel

The Air Transport Association of America (ATA) this month signaled its approval for the new synthetic aviation fuel specifications passed by the ASTM International Committee on Petroleum Products and Lubricants. "The ATA is very pleased that the full committee has approved the ASTM International Aviation Fuels Subcommittee recommendation," president/CEO **James May** said in a statement. "The unanimous passage of this specification is significant for all consumers of jet fuel. For the airline industry specifically, this brings us one step closer to our aim of widespread production of cleaner, alternative fuels that will help the industry meet its environmental goals while enhancing the security and competitiveness of its energy supply." ■

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## Camelina Holds Promise...

With a host of successful tests such as the Japan Airlines test flight behind them, advocates of camelina are now poised to take the next, even more arduous challenge – proving that the crop can make it as both an agricultural and energy business.

Right now all the signs are encouraging. “The cost of petroleum fuel is only going to go up, either forced by market pressures or governmental/policy measures like the EU tax on carbon, the US cap & trade bill, or low carbon fuel standards like California’s,” pointed out **Thomas Todaro**, CEO of Seattle-based Targeted Growth, a leader in developing camelina as a fuel source. “In the meantime, our costs are going down, as supply increases and as crop and processing technology advances.”

Currently, firms like Targeted Growth or Great Plains – The Camelina Company, based in Havre, MT, are generating about 100 to 120 gallons of biofuel for every acre of camelina they harvest.

That’s a fairly good yield, but to make camelina work as a feedstock for biofuels will require a massive amount of land, which advocates said should be available in the coming years.

“Looking at the state of Montana alone you have a maximum of one million acres,” explained **Dr. Duane Johnson**, VP for agricultural development for Havre, MT-based Great Plains-The Camelina Company. “But when you look at the Pacific and Western parts of the US we’ve got the potential to get to two million or even three million acres fairly easily.”

Todaro was even more optimistic, suggesting that as many as five million acres in North America could be devoted to camelina, adding, “Within five years, we expect to be producing between 300 million and 500 million gallons of camelina-based fuel in the US.”

But getting that much acreage devoted to camelina is not a forgone conclusion because as Johnson explained, “It’s still a matter of economics for farmers so we have to provide them with a return that is viable and competes with the crops they currently grow,”

Camelina does have several things operating in its favor as a traditional farmed



crop. First off it turns out that camelina is a great rotational crop with wheat. Wheat farmers, who in the past would keep a percentage of their land fallow in order not to leach all the nutrients from the soil though mono-cropping, can now instead plant Camelina to restore that soil.

The other economic benefit for farmers is that camelina can be used for more than just fuel – there is also a potential market for camelina meal – what remains after you press out the oil – as feed for animals.

“Right now camelina meal is not usable for cattle feed because it hasn’t gone through all the FDA testing,” explained **Ron Zellar**, an official with the Montana Department of Agriculture. But Zellar quickly added there’s a good potential that approval could eventually come, adding “The FDA just OK’d feed that’s 10% camelina meal for broiler chickens.”

Once the supply is established, the next step would be refining capacity and there appears to be optimism on that side as well. Honeywell subsidiary UOP, which has provided refining technology to petroleum producers for 95 years, suggested interest among refiners in processing camelina into jet and other bio-fuel is growing, especially as they realize that this new production won’t require an entire new processing infrastructure.

UOP initially got into refining biofuel

though a 2007 contract from Defense Advanced Research Projects Agency (DARPA) to convert bio-sources into JP-8 for use in military aircraft. But the company quickly realized any new technology would have tremendous commercial applications and have spent the past few years working with companies such as Boeing and Targeted Growth on developing, refining and testing various bio-fuels.

“Partnerships like what we have experienced with Boeing and Targeted Growth – as well as the aircraft OEMs, airlines and others that have supported these projects – are critical to achieving commercial production and use,” said **Jennifer Holmgren**, General Manager of Renewable Energy & Chemicals for UOP. “We need to have sustainable feedstocks in commercial scale quantity that are cost-competitive with petroleum, we need to have technology that can convert these feedstocks to on-spec fuel and we need to understand how this fuel performs and to pursue certification. To get where we want to be we need the participation and cooperation of the airlines, the airframers, engine OEMs, feedstock providers and technology developers.”

Holmgren stressed none of this is going to happen overnight, adding it would probably take between 24-30 months to build or revamp a refinery for camelina process-

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## Fueling California...

pointing out that even during normal demand the state is a new short market for jet fuel.

Among the study's conclusions was that finding that any state-issued carbon tax would negatively impact all aspects of the California economy, including commercial aviation that generates \$186 billion for the state annually.

New Fuels Report had the chance to chat with **Bob Sturtz**, Managing Director of Strategic Fuel Sourcing with United Airlines as well as the Fueling California's Board Chairman about the reasons behind the coalition, the impact of the study and the role he hopes Fueling California might play in shaping the debate surrounding both traditional and alternative fuels in the state going forward.

**NFR:** *What led to the formation of Fueling California and what does it hope to accomplish, especially as it relates to alternative fuels?*

**Sturtz:** Fueling California came together as non-profit coalition of the major fuel consumers in California. Our mission is not only to educate, but also to advocate for responsible regulations in the state as it relates to fuel availability, fuel cost and the content of that fuel.

We want California's elected officials, the media and most importantly the public to understand the potential negative impact that some the state policies and regulations can have on businesses, the economy in general and individuals throughout the state.

We also want to encourage the development of realistic alternatives. Fueling California recently went on record praising the new partnership between Rentech and eight airlines that will result in taking municipal waste such as branches, twigs and grass clippings and converting that into ultra-low sulfur diesel for ground service vehicles at Los Angeles International Airport. There haven't been a lot of these types of programs to date and so those are the kinds of technologies that Fueling California wants to get behind and support.

**NFR:** *Fueling California board includes a broad cross-section of the leading transportation dependent industries in California.*



*Bob Sturtz, Managing Director of Strategic Fuel Sourcing with United Airlines as well as the Fueling California's Board Chairman*

*Why was that important and was it important that the aviation industry have a voice on the board as well.*

**Sturtz:** The board of Fueling California is made up of some of the larger consumers of fuel in the state. These companies, which include the Avis Budget Group, Union Pacific, UPS, United, Harris Ranch, Ambassador's International and Con-Way Trucking, are already doing a lot to reduce emissions in the state on their own. But they had become very frustrated by the regulations that end up creating boutique fuels specifically for the state as well as some of the highest tax rates in the country. Also keep in mind California's tax rates are now the highest in the industry.

**NFR:** *What makes California's fuel situation so different from other parts of the country.*

**Sturtz:** As our recent study noted, California is essentially a fuel island. There are no pipelines that go down to the Gulf from here, so if airlines need additional fuel you have to import it. The study noted that during the time the economy was strong, airlines were having import 50% of the jet fuel needs for Los Angeles.

California is also a unique market in that it's certainly the most progressive state in terms of fuel specifications. We also notice that the rest of the country seems to be

following it.

But I don't want people to get the wrong impression about Fueling California. We're are totally supportive of the progressive nature of California and what they're trying to do. We are all for clean air and we're all for alternative fuels. But that has to be done in conjunction with the consumers because they're the ones who bear the brunt when regulations are passed and so there is a need to understand when regulations are passed what the implications are going to be for their own pocketbook.

**NFR:** *You mentioned during a recent press conference that Fueling California does not want to be seen at supporting alternative fuel solution over another. Why is it important for the coalition to maintain that neutrality?*

**Sturtz:** We believe alternative fuels should remain wide open to all sorts of possibilities that may arise. It's still a new area of research and over the next several years we're likely to see creative new approaches emerge. So Fueling California feels that no technology should be ruled out or in until all the questions about long-term viability, cost, environmental impact, supply are answered.

For that reason we don't feel our coalition should be out there trying to pick winners. But we also don't think the government should attempt to pick those winners as well because they've never been very good at it.

**NFR:** *The recent Fueling California backed study, "What Makes the California Fuel Environment Different in Terms of Policy, Cost and Vulnerability," generated a decent amount of media coverage and public interest. What's next for the coalition?*

**Sturtz:** One thing we would like to do is open a dialogue with the Air Resources Board (which is part of the California Environmental Protection Agency) so we can engage in an ongoing discussion. Fueling California supports what they're trying to do – we just want to help them mitigate the impact on consumers and we don't think those two things are in opposition of each other.

There's going to be costs to have cleaner fuels, we recognize that. But our coalition wants to make sure that everyone understands the consequences and the trade offs as we make these decisions ■

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## Camelina Holds Promise...

ing. She added, "Refiners are interested. We have been talking to fuel producers all around the world, but of course can not share names at this time. They see that the technology is viable and that the aviation industry is driven to diversify its fuel supply and reduce emissions."

Though there's still a lot to be done, including the development of certification standards. Holmgren concluded, "We believe that these elements will be satisfied and that commercial-scale production can begin in the next three to five years."

Camelina advocates are confident that once production ramps up, these bio-fuels and blends will be price competitive with fuels such as Jet A-1.

"We're an industry that's really in its Model T stage but I expect that we'll be able to catch up fairly rapidly in terms of productivity," noted Johnson, whose company has already had encouraging tests of Camelina-based fuel through a joint project with the

US Air Force. "We really only been dealing with camelina for about 15 years and you compare that to crop like canola where we have 200 years of experience. We're on a rapid learning curve and both our company and our competitors feel there is a real opportunity in aviation fuels for this crop."

If the production volume is there, it's likely that the aviation industry will be there as well.

Boeing spokesperson **Terrence Scott** noted the aircraft maker has been working closely with Targeted Growth and UOP on testing camelina and other bio-based fuels in jet engines and said, "The processing to convert it the synthetic equivalent of Jet A is about the same, but we really haven't flown it enough over the long term to know if there's going to be significant performance benefits. The Bio SPK is feedstock agnostic, meaning the 'DNA' of the fuel looks exactly the same a kerosene based fuel.

That's important, Scott explained, because one of the criteria for the successful integration of camelina – or any other biofuel – into the jet fuel supply chain is that

it has to be drop in, meaning an airline won't be required to do anything to an aircraft's engine in order to use it. "And you won't have to do anything to the current fuel infrastructure such as pipelines, he added.

Camelina is often compared to jatropha, switchgrass and algae as potential sources for fuel, but Todaro suggested that doesn't mean all these crops are in competition to be the dominant feedstock for jet fuel.

"There is no single source, silver bullet replacement for petroleum," he added. "It will take a variety of different feedstocks growing in different parts of the world to effectively meet the low carbon, renewable needs of the transportation industry in the future. We are all very much on the same team."

Scott agreed, noting, "What we're trying to do to come up with regional solutions that together can form a portfolio of bio jet fuels that can help fill a need in the future. At some point in the future we envision that maybe 10 to 15 bio-derived sources that will comprise that portfolio of fuel alternatives." ■

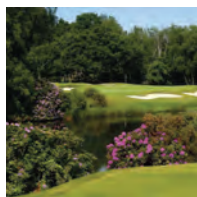
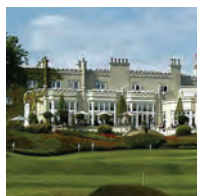
# JET FUEL SEMINAR AWARDS DINNER LOND ON, THURSDAY, SEPT. 17, 2009

- Finance and Credit Terms
- Supply Demand Fundamentals
- Market Risk Protection
- Alternative Jet Fuels
- Awards Presentation



# AAG Executive Session and Awards Banquet

September 17 - 18, 2009, Edwardian Hotel, London Heathrow



PROGRAM: Attendance includes access to all executive sessions, the AAG Special Report, Lunches, Coffee Breaks, Awards Banquet and one month subscription to Jet Fuel Report (JFR), New Fuels Report (NFR) and the AAG Daily Briefings.

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## SEPTEMBER 17, 2009

1030 - 1130 **Registration**

1130 - 1300 **Opening Lunch Sponsored By World Fuel Services**

1300 - 1400 **Session One: AAG Special Report**

Jet Fuel 2015: Challenges and Opportunities - The Next Five Years

The Session will offer a presentation that will focus on clear and important trends that promise to have a definite impact on global jet fuel markets over the next five years. Discussion will center on the five key trends – Major Market Consolidation, Government Intervention, Jet Fuel Infrastructure, Alternative Jet Fuels, The emergence of the BRIC's (Brazil, Russia, India and China) – and the AAG forecast through the period 2015.

*John H. Armbrust*, Armbrust Aviation Group

1400 - 1530 **Session Two: Risk Management**

The Session will empanel airline executives and risk management providers to discuss strategies to reduce market volatility.

*Olle Björk*, SAS (*invited*)

*Keith Carter*, Star Alliance

*Jonathan Pardoe*, Virgin Atlantic (*invited*)

*Jamie Trillow*, Deutsche Bank

*Aidan Shilling*, Standard Bank, Moderator

1530 - 1700 **Session Three: European Supply Demand Fundamentals**

The Session will empanel airline executives and jet fuel suppliers to discuss current supply demand issues in Europe with focus on regional refinery production and import requirements.

*Robert Bijl*, KLM

*Helmut Fredrich*, Lufthansa

*Nick Nigel*, Q8 Aviation (*invited*)

*Adam Walsh*, Bayford Company UK

*Gary Woodward*, Shell Aviation

*John H. Armbrust*, AAG, Moderator

1700 - 1800 **Session Four: Finance and Credit Terms**

Few issues are more problematic for airlines and suppliers than the issuance of credit. Historically, airlines were extended credit by suppliers for jet fuel purchases but over the past several years suppliers have pulled in credit due to airline financial difficulties. The session will discuss the impact on airlines and suppliers in a non-credit environment.

*Robert Sturtz*, United Airlines

*John H. Armbrust*, AAG, Moderator

1915 - 2000 **Board Buses to Awards Banquet**

2000 - 2300 **AAG Awards Banquet at Wentworth Club  
Sponsored By Aircraft Service International Group (ASIG)**

## SEPTEMBER 18, 2009

0830 - 0930 **Breakfast**

0930 - 1030 **Session Five: Infrastructure Challenges and Solutions**

This session will focus on infrastructure issues related to jet fuel storage and distribution with regard to funding, staffing, operational efficiency and competition from other petroleum products. The session will identify problem areas in a global context while offering business models that work.

*James Fee*, FSM Management Group

*Wade Morrell*, FSM Management Group

*John H. Armbrust*, AAG, Moderator

1030 - 1130 **Session Six: Development and Commercialization of Sustainable Bio-Jet**

Bio-jet fuels should become a priority for the aviation industry. They represent the only viable option for significantly reducing emissions from aviation without cutting the number of flights flown. Green Skies Thinking recommends the setting of achievable and enforceable targets for replacing standard kerosene jet fuel with bio-jet fuel from 2020, through the implementation of an EU-wide Sustainable Bio-jet Fuel Blending Mandate.

*Ben Caldecott*, Policy Exchange U.K.

1130 - 1300 **Closing Lunch Sponsored by New Fuels Report (NFR)**