

# Air New Zealand Flies on Engine With Jatropha Biofuel Blend

By James Kanter

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Some in the aviation industry say they could one day be flying the biggest jets across the planet without contributing to climate change — using biofuels.

They also say that it will be easier to convert planes to biofuels than land transport, because there are fewer planes than cars, trucks and buses, and there is a far less complex infrastructure to deal with, comprising only a few hundred airport fueling stations across the globe.

On Tuesday, Air New Zealand joined a clutch of other commercial airlines in testing out alternative fuels.

During a two-hour flight to and from Auckland International Airport, the Air New Zealand crew sought to test how the fuel, made from jatropha plants and blended 50:50 with Jet A1 fuel in the tank of one of four Rolls-Royce engines on a 747-400, stood up to use at high altitudes and in other demanding conditions.

Air New Zealand and the other companies participating the project were to “review all the results as part of our drive to have jatropha certified as an aviation fuel,” said Air New Zealand Chief Pilot Captain David Morgan, who was part of the test flight.

Using jatropha-based fuel still emits carbon dioxide, but the gas is typically recycled in the growing of the feedstock, so there is ostensibly no additional CO<sub>2</sub> added to the atmosphere.

Even so, critics have taken issue with biofuels, which they say could drive expanded deforestation, or would compete with food commodities, raising food prices

across the board — particularly for poor families and poor communities.

Aviation industry officials say that they are committed to using sustainable biofuels that do not threaten food supplies for land or water as part of their alternative fuel tests. “A major part of the industry’s future carbon emissions reduction plans rely on the ability for aircraft to shift towards biofuels,” according to the industry.

Air New Zealand said the jatropha it sourced and refined for its test flight came from Malawi, Mozambique, Tanzania and India, and was from seeds grown on environmentally sustainable farms. The airline said each jatropha seed produces between 30 and 40 percent of its mass in oil and that jatropha can be grown in a range of difficult conditions, including arid and otherwise non-arable areas, leaving prime areas available for food crops.

Air New Zealand also explained that the criteria for sourcing the jatropha oil required that the land was neither forest land nor virgin grassland within the previous two decades. The quality of the soil and climate was such that the land was not suitable for the vast majority of food crops. Furthermore, the farms the jatropha was grown on were rain-fed, not mechanically irrigated.

## Biofuel Test Flight Report Shows Significant Fuel Saving

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*Scientific testing has found that up to 1.4 tonnes of fuel can be saved on a twelve-hour long haul flight powered by a 50/50 blend of second generation jatropha sustainable biofuel and traditional Jet A1.*

The remarkable result is one of the key findings from the Air New Zealand Boeing 747-400 Rolls-Royce powered test flight in December last year.

Air New Zealand General Manager Airline Operations and Chief Pilot Captain David Morgan, announced the scientific findings from the test flight today at the Eco-Aviation Conference in Washington.

The test flight, a joint initiative between Air New Zealand, Boeing, Rolls-Royce and Honeywell's UOP, was carried out on 30 December as part of commercial aviation's drive for more sustainable air travel for future generations and used the highest blend of any type of biofuel in a test flight.

The biofuel test programme included extensive on-the-ground and inflight tests of the engine and aircraft components. During the comprehensive flight test, analysis was carried out at various altitudes and under a variety of operating conditions to measure the biofuel's performance through the engine and fuel systems.

A report prepared by Air New Zealand, Boeing and Rolls-Royce to analyse the data collected throughout the flight says the biofuel selected has demonstrated the potential for use as a drop in replacement to Jet A1 at a blend ratio of up to 50:50. This material now needs to be submitted to the rigorous industry evaluation and approval protocol to enable it to be certified for everyday use.

The report also found that the biofuel's properties offer some performance improvements over Jet A1 due to its higher net heat of combustion including:

Using this biofuel blend, the fuel burn for a Boeing 747-400 aircraft twelve-hour flight (5800 nautical miles) would improve by 1.2%, saving 1.43 tonnes of fuel.

Such a reduction in fuel burn would result in a significant reduction in carbon emissions, saving approximately 4.5 tonnes of CO<sub>2</sub>.

At shorter ranges, fuel burn will improve by 1% when using a mix of 50% biofuel to 50% Jet A1. Overall savings due to these hydrotreated bio-derived jet fuels from naturally occurring oils is estimated to be a 60-65% reduction in greenhouse gas (GHG) emissions relative to petroleum-derived jet fuel.

The report says the test flight has demonstrated that more sustainable air travel can be achieved by refiners, airframe manufacturers, engine makers and airlines working together. It should also give those drafting fuel certification regulations more confidence to push ahead and reduce the timeline for certification of a bio-derived drop-in jet fuel to occur.

Data from this evaluation flight program will be published to various industry bodies to contribute to the current program evaluating this and similar fuel products with a view to achieving approval of them as alternatives to existing Jet A1.

Captain Morgan said the scientific findings were significant for the aviation industry, which stands at the earliest stages of sustainable fuel development.

"Certainly the data from our biofuel test flight will be a critical component towards helping biofuel become a certified aviation fuel," he says.

Captain Morgan said it was Air New Zealand's goal to become the world's most environmentally sustainable airline, and that it was proud to have played an important role in furthering the industry's body of knowledge on sustainable alternative biofuels.

"There is a great deal to be done by the industry as a whole and Air New Zealand will continue to lend its support.

"We currently have a team looking at several different biofuel options. We remain committed to our ambition of having 10% of our fuel needs by 2013 met by alternative fuels, but appreciate there are many more steps to be taken by experts in other areas to deliver biofuel as a commercial aviation fuel source," he says.

### Ends

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