

Velocys, an Oxford-based biofuels company, is trying to make renewable jet fuel a reality. *Biofuels International* caught up with the firm's business development director, Neville Hargreaves, to talk about the company's move into commercial operation and the nuances of biofuels in the aviation sector



# Getting renewable jet fuel off the ground

by Luke Acton

**B**ritish Airways signed on with Velocys and Suez in September 2017 to develop a plant aimed at producing renewable fuel from municipal solid waste. BA is to use the fuel in its aircraft. The announcement of the partnership boosted Velocys' stock by 40%.

The product from this plant is expected to achieve an over 60% reduction in greenhouse gas emissions and 90% reduction in particulate matter emissions compared with conventional jet fuel.

"For me, the thing that's crucial about jet is that it's the hardest product to decarbonise and so the need for renewable jet fuel is more acute, the supply

options are far more limited, and so we see that as the most important and most attractive end market," says Hargreaves, who is working to introduce the fuel. The business development director has previously worked in R&D for Exxon Mobil and for the management consultants Bain & Company.

"[There] are, presently, five technology pathways certified by ASTM for making aviation fuel. Ours [the Fischer-Tropsch pathway]... is one of them. Assuming that a technology pathway can get through that certification, it's still got to make the product and make it in a cost-effective way and see the way to a long-term sustainability of supply. And we think that

starting from waste or from forest residues gives access to a big volume of supply, which is pretty important.

"It's a capital intensive process, but that investment allows you to access that long-term volume and our responsibility is to get plants built and then start driving the costs down as time goes on."

While contributing to the creation of a circular economy in its utilisation of waste, Fischer-Tropsch jet fuel also improves on conventional jet fuel through the absence of aromatics, making it a cleaner fuel to burn.

"[In our jet fuel] particulate emissions, hydrocarbon emissions, CO emissions are all significantly lower... So we're getting an emissions

benefit as well, but we're also delivering pretty much equal energy density to conventional jet fuel."

Even with these qualities, however, there are still very few flights using sustainable fuel. What is needed is not to figure out how to make the fuel, but to build the supply chain.

"The hurdle is getting commercial plants into operation. At the moment, there's virtually no supply of sustainable jet fuel. Such as there is, is based on... waste oils, which is a sensible thing to do in the short-term, but doesn't really address the long-term challenges and [there] just isn't enough sustainable supply.

"Plants using a conversion



Neville Hargreaves, business development manager at Velocys

pathway [that have] access to a long-term feedstock supply, getting commercial plants in the ground, producing product, that's the challenge that's right in front of us and that's what we intend to do."

The move to sustainable jet fuel needs to be facilitated by market forces though, Hargreaves says. Despite willingness to change from some parts of the aviation sector, Government programmes are required to create that dynamic, to create a system that links profit to ecological good.

"British Airways [has] made it very clear that they intend to pursue the path of development of biofuels and not just to be an off-taker, but to actually take part in projects to... move up the supply chain in order to stimulate and hasten that adoption. So it's not a question of resistance, they're collaboratively leading on it.

"But this only works if you have a market-based mechanism that gives some reward for making low-carbon products. Because what doesn't work today is to be paid a petroleum price for a product that is, fundamentally, delivering vastly higher value. But the airlines are under great competitive pressure for price, so you need mechanisms like the Renewable Fuel Standard [RFS] in the United States or the Renewable Transport Fuels Obligation [RTFO] in the UK.

"You may know that the

RTFO has now been amended to include aviation fuel, [which is] a huge step forward and [gives] a market mechanism for additional incentives for fuels that make a real difference to the difficult sectors like aviation. And that of course is paid for, not by the government, but by the users of fossil fuels."

But legislation supporting biofuel is not always moving forward. Commenting on the current debate in America over the RFS, Hargreaves says that he has confidence in the programme's continued existence, if not in its current form. For him, despite the volume and noise of climate deniers, the sway of Big Corn and concerns over energy security will be enough to see it into the future.

Replacing fossil fuels with renewable jet fuel wholesale is still a way off however, even with this support.

"When we start to break the 50% [blending] barrier (which is what it is currently for Fischer-Tropsch) then we'll worry about how we'll get to the other fifty. At the minute, you know, if we got to 1% we'd think that was pretty good. The barrier is that supply.

"At the moment, I think the barrier is, partly, access to capital, in that there are not so many proven technology routes to sustainable jet fuel. There are ones whose product has been approved, but that's not to say that the technology for manufacturing it is proved in operation. So what we're doing is assembling proven components in a new way to make a commercial plant, making that product.

"Once we've done that, I think the access to capital will become a lot easier and then it will be about access to feedstock. And there's... enough to make a substantial dent in the jet fuel supply."

At the stage that this sector of the biofuels industry is in and the relative legislative uncertainty, there is still a

considerable amount of risk. Hargreaves doesn't see that as a problem though.

"In terms of the technology risk, we are the people to reduce that by putting plants in the ground... [But] as companies build plants and show that it can be done, show that it can be done cost-effectively, then the technology risk is overcome. And it's a long road, it's not something you can do overnight. But the actual commercial plants are the crucial step. All the stuff beforehand is necessary, but in the end none of it matters until you can get a commercial plant in operation."

The industry is often seen as going up against the fossil fuel giants (as it is in the RFS debate), but Hargreaves says it doesn't have to be this way. What is damaging fossil fuels isn't the biofuels industry, but the harm that those fuels do to the environment. The fossil fuel industry can decide to get on board with addressing environmental concerns with the considerable resources it has at its command, or it can dig its heels in at every change designed to curb emissions.

"The existential threat to fossil fuels isn't biofuels, it's climate change. Fossil fuel operators will not have a license to operate if we don't stop killing the planet. Look, it might not be that biofuels is the solution," Hargreaves mentions

electric cars as essential

to decarbonising transport. "What we need to do is transition to mobility without climate change impact, so that's the existential threat.

"Now, some of the fossil fuel producers are actively involved in developing the next generation [of fuels] for themselves. Whether that be through biofuels or through alternative solutions for transport, they're in this game too. There will be some who don't innovate and get left behind, but I don't see it in the same way. Fossil fuels are under threat, there's no doubt about that, but they don't have to see biofuels as opposed, that's a choice that each player has to make on their own."

Ultimately, no matter the fights won, the legislative progress made or the technological advancements achieved, it's about seeing a technology through to commercialisation, says Hargreaves. Without it, what's the point?

"...proof is in building and operation of commercial plants. I am very interested in innovation, but innovation is only truly complete when you have commercial supply in operation... [I think people recognise] just how important and just how difficult it is to make that last step."

"In the end it's hard to do, but we've got to do it and we are doing it." ●

All images courtesy of Velocys.



Aerial view of the Velocys plant in Oklahoma City