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## How to make jet fuel from used cooking oil

Air travel is a growing source of greenhouse gas emissions. But a project to turn used cooking oil into jet fuel could help change that, says Tom Parsons



[https://www.youtube.com/watch?time\\_continue=2&v=Fe9bPiE0NMU](https://www.youtube.com/watch?time_continue=2&v=Fe9bPiE0NMU)

A project that makes fuel for aeroplanes out of used cooking oil could help slow the growth of greenhouse gas emissions from air travel.

BP is selling green aviation fuel, BP Biojet, to three airports in Norway and Sweden. The first to join was Norway's [Oslo Airport](#) in 2016, followed by Halmstad in Sweden and Bergen in Norway, [both in 2017](#).

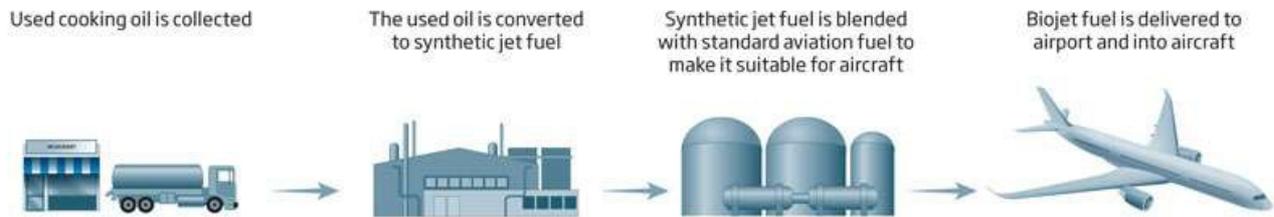
It is a small start, but it could become a lot bigger. In November 2017, as a proof of principle, aviation biofuel was used for a day at Chicago O'Hare, one of the busiest airports in the world.

Biojet reduces greenhouse gas emissions by more than 60 percent compared with standard fossil jet fuel, one of the key reasons it has been accredited as part of BP's Advancing Low Carbon programme which aims to recognise and encourage low carbon action across the company. \*

Aviation is a significant source of greenhouse gases. "Today, aviation accounts for about two per cent of global emissions," says Tom Parsons, Biojet commercial development manager at Air BP. That is not a huge percentage, but aviation is one of the only sectors of the economy whose emissions look set to grow. "It will become three per cent by around 2050 if no action is taken."

The International Air Transport Association has set a target of cutting aviation's net carbon dioxide emissions by 50 per cent by 2050, relative to 2005 levels. As part of

this, a scheme called CORSIA aims to cut emissions from international flights, by forcing operators to pay to offset their emissions. However, this is only a partial solution.



The problem is that it is difficult to cut the emissions from aeroplanes, compared to road and rail transport. “It’s really hard to electrify,” says Parsons. “You physically can’t carry enough battery weight to make those planes fly, at this stage.”

Instead, BP is focusing on replacing conventional jet fuel – which is essentially high-grade petrol and derived from oil – with a sustainable equivalent. This is where the BP Biojet from used cooking oil comes in.

Until recently, waste oil from restaurants was typically poured into landfill, where it decays and produces methane – another greenhouse gas. That can have “a really negative impact on the environment”, says Parsons. So BP is using this recycled oil in its new green, aeroplane fuel.

First, tankers collect used cooking oil from restaurants. Then the oil is processed into fuel. “It’s aggregated, it’s cleaned up a bit, and then it goes into a specialist bio-refinery,” says Parsons. There it undergoes a chemical reaction with hydrogen. “That removes the oxygen that’s there in the cooking oil and cleans it up even further and gives it the right properties, such that it’s indistinguishable from fossil jet fuel.”

The benefit of this is that the new fuel can be carried in the existing pipes and tankers, and pumped straight into planes. “You don’t need to modify the planes,” says Parsons. “Nothing needs to change.”

It’s not yet possible for an aeroplane to fly solely on aviation biofuel. Instead, it has to be blended with conventional fuel. “You can have a one-to-one ratio of the biofuel with the conventional jet fuel,” says Parsons. This limit arises because aviation fuel needs to contain a small amount of ring-shaped organic molecules called aromatics.

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**Meet Tom Parsons (Sponsored by BP)**  
 op SoundCloud.


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<https://soundcloud.com/new-scientist/meet-tom-parsons-sponsored-by-bp> **“The aviation biofuel doesn’t have any.”**

In practice, planes tend to fly with a small percentage of BP Biojet fuel. When a person books a plane ticket from airlines that uses Biojet, they may be offered the option to pay extra. If they opt in, the money is used to buy the Biojet.

Still, used cooking oil will never supply enough aeroplane fuel for all the world’s planes, not even close. “There is a surprisingly large amount of used cooking oil available, but only to a certain point,” says Parsons. “By its very nature it’s limited.”

The plan is for cooking oil to be the first of many alternative ways to make BP Biojet. For instance, it is possible to make fuel from solid household waste. “There’s even potential to convert excess renewable energy into liquid fuels,” says Parsons.

No single technology will be enough, Parsons emphasises. “We’re going to need everything.”

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\* For more details on BP’s Advancing Low Carbon programme and BP Biojet go to [bp.com/biojet](https://www.bp.com/biojet)

