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Waste coffee grounds set to fuel London with biodiesel and biomass pellets

Bio-bean, a new London based company, is taking waste coffee grounds and turning them into biofuels. Tim Smedley reports

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Using waste coffee grounds to make biomass pellets and biodiesel. Second-generation biofuels made from residual waste have come of age. Photograph: Phil Noble/Reuters

Sometimes an idea seems so good you can't believe it hasn't been done before. Using waste [coffee](#) grounds to make biomass pellets and biodiesel occurred to Arthur Kay when he was studying architecture at UCL in 2012. Tasked with looking at closed loop waste-to-energy systems for buildings, he happened to choose a coffee shop. But when he discovered the oil content in coffee and the sheer amount of waste produced – 200,000 tonnes a year in London alone – he jacked in the architecture and set about forming a company called [Bio-bean](#). Kay is now one of 2014's "London Leaders" – Boris Johnson's scheme to promote green entrepreneurship. He has been on Johnson's radar since 2012.

"After working on this for a couple of weeks I entered the Mayor's Low Carbon Prize and was lucky enough to be among the winners", says Kay. This gave him the impetus to take it forward and team up with business partner Benjamin Harriman. They have since attracted over £100,000 in grants and funding. The idea is not to start small and grow bigger; it's to start big.

"People think of us in a tiny little van or bicycle going round and collecting 10 kilos from each coffee shop," says Kay. "We are instead focusing on the [waste streams] of large-scale coffee

producing factories in or around London. We're currently in conversation with a couple of major coffee shop chains too, who are really interested. Our processing plant isn't operational yet but we're looking at a six to eight-month timeframe to set up a large-scale waste-processing site in Edmonton, North London, capable of processing 30,000 tonnes a year."

The technology Bio-bean is using to do this is a mixture of old and new. "Imagine you have a pile of coffee grounds," says Kay. "You dry them, then we have the patent for the bit in the middle that allows us to extract oil from it. It's a biochemical process, a solvent that you evaporate through what's called 'hexane extraction'. By weight it is about 15-20% oil. The remaining 80-85% is then turned into bio-mass pellets used to be burned in boilers." The solvent is also 99.9% recyclable, meaning it can be used over and over.

While first-generation biofuels have faced criticism for competing with food crops, second-generation biofuels made from residual waste have come of age. McDonald's now [powers some of its vehicles](#) with its waste cooking oil. However, while cooking oil has to go through costly filtering processes, coffee is a pure waste stream, and a growing one thanks to our insatiable caffeine habit.

"We see this as the next step in creating a sustainable supply chain," says Kay. "People have concentrated a lot on the first stage of the supply chain, the Fairtrade and Rainforest Alliance movements to ethically source coffee. But then as soon as someone drinks it it's seen as the end of it – we're saying the next step of [sustainability](#) is to close the loop and ethically dispose of it, and creating something really valuable from it."

The main market for the fuel is London's transport system – the prospect of a "Bio-bean bus" is not far-fetched given some [London buses already run on biodiesel](#). Major coffee companies and high street chains have expressed interest – fuelling their fleets or factories with waste coffee would be a major PR boon.

Biomass pellets are another idea that has come of age. Biomass boilers for homes are supported by the Green Deal and are becoming more common in factories and large public buildings. Yet, says Kay, they mostly burn wood pellets shipped over from North America. Bio-bean's initial tests have found coffee pellets to produce 150% more energy than wood due to their higher calorie content.

Coming from essentially free waste, Kay believes both the biodiesel and pellets can be produced at 10% below market trading price. If it all sounds too good to be true, then it's because there's nothing yet to show for it. "We've done a number of successful trials, have worked with a number of waste producers and teamed up with all the relevant people – we've got interested investors, good funding," says Kay. "However, there is a big, big gap between concept and going into production."

The plan is to end the year with a major processing plant up and running inside the M25, using coffee produced in London, drunk by Londoners, to power London's buildings and transport. If it happens, it won't just be a good idea – it will be a great one.