

Could you run your car on coffee?

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Researchers used 20 different types of coffee to assess the quality of biofuel produced from each one

(Phys.org) —New research from our Centre for Sustainable Chemical Technologies shows that waste coffee grinds could be used to make biodiesel.

Oil can be extracted from [coffee](#) grounds by soaking them in an organic solvent, before being chemically transformed into biodiesel via a process called "transesterification". The study, recently published in the *ACS Journal Energy & Fuels*, looked at how the fuel properties varied depending on the type of coffee used.

As part of the study, the researchers made biofuel from ground coffee produced in 20 different geographic regions, including caffeinated and decaffeinated forms, as well as Robusta and Arabica varieties.

Dr Chris Chuck, Whorrod Research Fellow from our Department of Chemical Engineering,

explained: "Around 8 million tonnes of coffee are produced globally each year and ground waste coffee contains up to 20 per cent [oil](#) per unit weight.

"This oil also has similar properties to current feedstocks used to make biofuels. But, while those are cultivated specifically to produce fuel, spent coffee grounds are waste. Using these, there's a real potential to produce a truly sustainable second-generation biofuel."

The research found that there was a reasonably standard composition and little variation in the relevant physical properties of the fuels, irrespective of the source. This means that all waste coffee grounds are a viable feedstock for producing biodiesel.

Dr Chuck explained: "The yields and properties of biodiesel can differ depending on the growth conditions of current biodiesel feedstocks, sometimes causing them to fall out of specification. The uniformity across the board for the coffee [biodiesel fuel](#) is good news for biofuel producers and users."

The researchers suggest that while coffee biodiesel would be a relatively minor part of the energy mix, it could be produced on a small scale by coffee shop chains to fuel vehicles used for deliveries. These same delivery vehicles could be used to collect spent coffee grinds and take them to a central biodiesel production facility to be processed. Companies such as London-based bio-bean already produce biodiesel and biomass pellets from waste [coffee grounds](#).

Rhodri Jenkins, a PhD student in Sustainable Chemical Technologies and first author of the study, said: "We estimate that a small coffee shop would produce around 10kg of coffee waste per day, which could be used to produce around 2 litres of biofuel.

"There is also a large amount of waste produced by the coffee bean roasting industry, with defective

beans being thrown away. If scaled up, we think coffee [biodiesel](#) has great potential as a sustainable fuel source."

The researchers are also looking at using other types of food waste as a feedstock to make biofuels and expect to publish their findings later in this year.

More information: Study paper:
pubs.acs.org/doi/abs/10.1021/ef4022976

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