

Leftover grain from breweries could be converted into fuel for homes

November 26 2019



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A Queen's University Belfast researcher has developed a low cost technique to convert left over barley from alcohol breweries into carbon, which could be used as a renewable fuel for homes in winter, charcoal

for summer barbecues or water filters in developing countries.

Breweries in the EU throw out around 3.4 million tons of unspent grain every year, weighing the equivalent of 500,000 elephants.

Using just 1kg of the grain, Dr. Ahmed Osman from the School of Chemistry and Chemical Engineering has been able to create enough activated [carbon](#) to spread across 100 football pitches.

The results have been published in the *Journal of Chemical Technology and Biotechnology*.

Dr. Osman explains: "There are only a few steps in our low cost and novel approach—drying the grain out and a two-stage chemical and [heat treatment](#) using [phosphoric acid](#) and then a potassium hydroxide wash, both of which are very low cost chemical solutions. This then leaves us with activated carbon and carbon nanotubes—high value materials which are very much in demand.

"Liquid forms of carbon are normally shipped to the UK from the Middle East, and solid biocarbon, in the form of wood pellets is shipped from the US and elsewhere. Using this new technique, we can utilise more locally produced resources, reduce emissions linked with the agriculture sector, and we are also creating a high-value product.

"Across the globe there is a real demand for carbon as it is used to create fuel for households, parts for water filters and charcoal for barbecues. If we are able to take something that would otherwise be a waste and turn it into a useful biofuel, it can only be a good thing for our planet. It could really help to solve global waste and energy problems."

Dr. Osman adds: "The synthesis of value-added products from barley waste is a prime example of the circular economy, by taking a waste

food by-products and creating a high-value product. It has benefits to the environment and society through economic and [social opportunities](#)."

The project was funded by EPSRC and The Bryden Centre at Queen's. It was an [international collaboration](#) between Queen's University Belfast, South West College and Sultan Qaboos University in Oman.

Dr. Osman is hoping to explore opportunities for the commercialisation of the method in creating activated carbon and carbon nanotubes.

Queen's University's work on biofuels from waste will be featured in an upcoming major conference, Engineering the Energy Transition from 26 to 28 February 2020 in Belfast.

Provided by Queen's University Belfast

Citation: Leftover grain from breweries could be converted into fuel for homes (2019, November 26) retrieved 17 April 2024 from <https://phys.org/news/2019-11-leftover-grain-breweries-fuel-homes.html>

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