

Indian Scientists in US Convert Discarded Plastic into Petroleum Products

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Kounteya Sinha | TNN |

LONDON: In a major breakthrough Indian-origin scientists based in US have successfully converted plastic shopping bags into diesel, natural gas and other useful petroleum products.

The conversion produces significantly more energy than it requires and results in transportation fuels like diesel. Other products such as natural gas, naphtha (a solvent), gasoline, waxes and lubricating oils such as engine oil and hydraulic oil also can be obtained from shopping bags.

Brajendra Kumar Sharma, a senior research scientist at the Illinois Sustainable Technology Center led the research. He said it involved a process called pyrolysis which is essentially heating the bags in an oxygen-free chamber.

Sharma said, "Plastic bags make up a sizeable portion of the plastic debris in giant ocean garbage patches that are killing wildlife and littering beaches. Plastic bags have been detected as far north and south as the poles. Over a period of time, this material starts breaking into tiny pieces and is ingested along with plankton by aquatic animals. Fish, birds, ocean mammals and other creatures have been found with a lot of plastic particles in their guts," Sharma said.

"Turtles, for example, think that the plastic grocery bags are jellyfish and they try to eat them," he added.

"You can get only 50 to 55% fuel from the distillation of petroleum crude oil," Sharma said. "But since this plastic is made from petroleum in the first place we can recover almost 80% fuel from it through distillate ion".

World Watch Institute says factories around the world churned out 4–5 trillion bags in 2002 ranging from large trash bags to thick shopping totes to flimsy grocery sacks.

Previous studies have used pyrolysis to convert plastic bags into crude oil. Sharma's team took the research further by fractionating the crude oil into different petroleum products and testing the diesel fractions to see if they complied with national standards for ultra-low-sulfur diesel and biodiesel fuels.

A mixture of two distillate fractions providing an equivalent of US diesel met all of the specifications required after addition of an antioxidant, Sharma said.

"This diesel mixture had an equivalent energy content, a higher cetane number (a measure of the combustion quality of diesel requiring compression ignition) and better lubricity than ultra-low-sulfur diesel," he said. The researchers were able to blend up to 30% of their plastic-derived diesel into regular diesel and found no compatibility problems with biodiesel.

"It's perfect," Sharma said. "We can just use it as a drop-in fuel in the ultra-low-sulphur diesel without the need for any changes."

The first plastic bags were introduced in the United States in 1957. Plastic trash bags started appearing around the world by the late 1960s.

North America and Western Europe account for nearly 80% percent of plastic bag use— though the bags are increasingly common in developing countries as well.

A quarter of the plastic bags used in wealthy nations are now produced in Asia. Each year Americans throw away some 100 billion polyethylene plastic bags. Only 0.6% of this is recycled. The rest of the bags end up in landfills or escape to the wild, blowing across the landscape and entering waterways.
