Could your plastic film packaging serve a purpose? We won’t know until recycling laws change

Hard-to-recycle plastic waste could be an untapped resource but current laws make it difficult for UK companies to innovate.

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From the clear covering on your microwave meal to the flimsy bread bag lying on the kitchen counter, plastic film is notoriously tricky to recycle. But what if those annoying bits of plastic waste could be put to better use?

This hard-to-reycle plastic [1] could be transformed, potentially into a source of fuel, but the UK’s current recycling rules make it difficult for companies to innovate and experiment.

The main legal barrier is the definition of recycling itself. Under the rules UK waste law is built on [2], recycling cannot include turning waste into anything that will be used as fuel. A separate category for the plastics that are the hardest to recycle, recognising fuel made from waste that would otherwise be burned, would give companies more scope to experiment with new ways to process it.

As a legal researcher, I study how the law decides what counts as recycling. My work raises a simple question. If the rules allowed it, could dealing with one problem, plastic waste, also help ease another, our dependence on imported fuel?

In Darlington in north-east England, a chemical recycling company has received planning permission for what it describes as the UK’s first large-scale plant for recycling plastic film [3]. The company, Endolys, plans to take up to 120,000 tonnes a year of waste plastic film, such as bread bags, wrappers and pouches, and turn it into so-called pyrolysis oil, subject to an environmental permit from the Environment Agency being granted.

Pyrolysis involves heating plastic to a very high temperature without air. With no oxygen, the plastic cannot burn, so it breaks down into pyrolysis oil along with some gas and solid residue. It is a little like making charcoal, where wood is heated without being allowed to catch fire.

Recycling waste plastic film in this way has had mixed results around the world. In Texas, US, ExxonMobil now processes more than 70,000 tonnes of plastic waste a year this way. But in the Netherlands, a Rotterdam pyrolysis plant with a deal to supply Shell never reached its planned capacity [4] and has now closed for good. In Japan, a plant using a related process with very hot, pressurised water opened in 2025 [5], and can process 20,000 tonnes of waste plastic a year.

What happens to the oil? Plastic doesn’t go in one end and come out as diesel. Pyrolysis oil is closer to crude oil. It has to be cleaned and refined before it can become fuel, or it can be used to make new plastics. The new facility at Darlington expects to produce around 80,000 tonnes of pyrolysis oil a year [6].

There is a catch for energy security. Endolys has agreed to sell all of that oil [6] to a global trader for European refineries. A plant only strengthens the UK’s own supply if the oil stays in the UK.

Read more: Soft plastic recycling laws have been delayed – an expert explains why [7]

At the moment, most of this kind of plastic is burned in incinerators. Burning plastic can produce dioxins, toxic chemicals linked to cancer [8], although modern incinerators filter out most of them, and must meet strict limits.

Because pyrolysis works without air, fewer of these chemicals should form. An Italian study [9] comparing the two found the health risks from pyrolysis were low. For people living near an incinerator for many years, it put the cancer risk close to one extra case in every million people, the level the researchers treated as acceptable and a common benchmark in health risk assessments.

A German study [10] found that turning plastic into oil rather than burning it could cut the greenhouse gas emissions from dealing with the waste by more than half, and by up to 94% as Germany's electricity becomes cleaner.

Pyrolysis plants often burn some of their own gas to keep running, and that part is regulated much like an incinerator. Inks, food residue and chlorine from some plastics can end up in the oil and need removing. When the oil is finally burned as fuel, its pollution and carbon are released then. And in Darlington, some residents have petitioned against the plant [11] over health fears.

Rules matter

UK waste policy tries to keep plastic in use as plastic, recycled into new bottles, trays and packaging. Turning plastic into fuel generally doesn't count as recycling.

That makes sense for plastic that can be recycled. But plastic film is one of the hardest materials to deal with. Councils in England were due to start collecting it from every home by March 2027, but the government has pushed that back to 2030 [12], partly because there aren't yet enough places to recycle it. Meanwhile, much of it is burned to generate a little electricity.

For those genuinely leftover plastics, I believe that the line between recycling and fuel deserves a second look. At the moment, the rules do little to encourage plants like Darlington to sell their oil in the UK, so the energy security benefit goes elsewhere. Rules that rewarded keeping this oil at home could change that.

Plastic waste will never replace imported oil. On its own, Darlington's 80,000 tonnes of oil a year would match only about 0.1% of the 61 million tonnes of oil products the UK used in 2025 [13]. That's roughly half a day's worth. But Darlington is one plant.

England's rubbish still contains around 4.2 million tonnes of plastic a year [14]. If half of that were turned into oil at Darlington's rate and kept in the UK, it could meet a little over 2% of the country's oil needs. With the right rules, a small, steady supply from bread bags and food wrappers in our bins could help the UK be a little less exposed to future fuel shocks.

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