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Innovate UK

Driving plastic packaging innovation



Smart Sustainable Plastic Packaging Challenge

With a portfolio of over 80 funded projects, UKRI's £60 million Smart Sustainable Plastic Packaging Challenge, delivered by Innovate UK, is the largest and most ambitious UK government investment to date in sustainable plastics research and innovation. It supports bold, ambitious innovation to bring about wholesale change in the UK's ability to reduce, reuse and recycle plastic packaging, and reduce plastic pollution.



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Ramping up returnables

2024 is an exciting year for Reposit, a collaborative returnable packaging platform developed to accelerate the transition to reuse for all stakeholders. In January, in partnership with Reposit, M&S expanded its Refilled Homecare scheme to ten own-brand cleaning and laundry products and to 17 more UK stores, taking the total number of participating stores to 23. The cross-sector partnership between Reposit, City to Sea, M&S and Ecover is also exploring further opportunities for returnable packaging systems at scale across product categories and channels.



Acing reusable packaging

CLUBZERØ is a smart return system that combines reusable packaging, tracking technology and drop point infrastructure to provide customers across the FMCG, Retail, QSR and Food Service sectors with a convenient and scalable alternative to single-use packaging. For the second consecutive year, they partnered with Barclays at the Wimbledon Championships 2024 to offer customers ice cream in their Perfect Pots, diverting an estimated 50,000 single-use items from ending up in landfill.



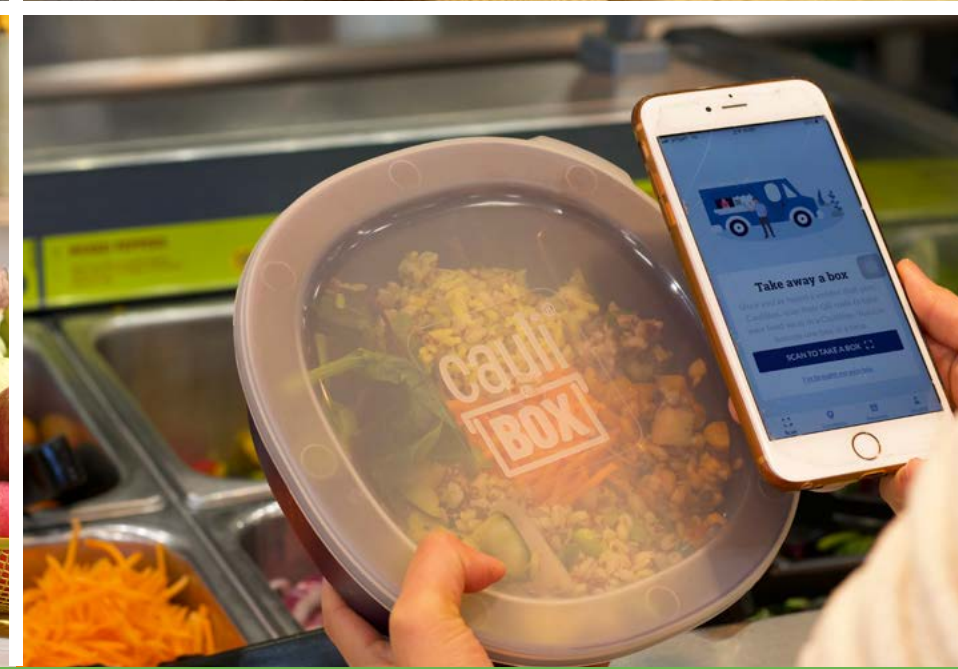
UK's first refillable plastic milk bottle

Abel & Cole has delivered a ground-breaking innovation, creating the UK's first ever refillable polypropylene milk bottle for the launch of its Club Zero Refillable Milk. The product, which joins the firm's growing refillables range, will save 450,000 single-use plastic milk bottles and 60 tonnes of carbon each year. Having decided plastic was the best material for the job, the reusable bottle took three years and seven teams of experts – including Berry Global, Campden BRI and Berkeley Farm Dairy – to develop.



Takeaway without the throwaway

Cauli is on a mission to disrupt the urban food industry with technology and automation to help the catering sector and its customers shift to reusable food and beverage packaging.



Since 2019, the firm has developed and trialled the Cauli Reuse System (CRS) supply chain and tracking technology, featuring a customer app, admin panel, and smart collection kiosks. CRS is now running in over 30 sites, including private sector firms like Linklaters and educational institutions like University of Greenwich.

Greener decontamination

Nextek's COtooCLEAN™ is a revolutionary decontamination technology that can turn post-consumer plastic films back into food-grade film. The process combines super-critical CO₂ with green co-solvents to remove odours, oils, fats and printing inks. Requiring no water or corrosive chemicals, it can also delaminate and de-metallise multi-layer films, supporting greater circularity in food-grade film packaging. The process has won a number of awards, including the \$3m Alliance Prize in Circular Solutions for Flexibles in 2022.



Informing future flexibles design

The Circular Economy for Flexible Packaging (CEFLEX) is a major European collaboration working to provide independent, scientific data on the design, sortability and mechanical recyclability of flexible packaging. With SSPP support, it is running an extensive industrial scale testing programme to generate robust independent data to inform flexible packaging design guidance. In early 2024 it published the first report on how Near Infrared (NIR) devices see and classify a range of flexible packaging formats and materials.



The collection challenge

The £2.9m Flexible Plastic Fund FlexCollect project is the most extensive pilot for household collection and recycling of flexible plastic packaging ever undertaken in the UK. Managed by a consortium comprising Ecosurety, SUEZ recycling and recovery UK, RECOUP and WRAP, FlexCollect is working with volunteer local authorities to run series of collection and recycling pilots. These are building vital understanding of how to incorporate flexibles into existing collections across different geographies, demographics and collection formats.



Recycle-ready films

Interface Polymers Ltd and Flexipol Ltd are running a collaborative project, entitled 'Recycle Ready Films', to develop an additive that allows multi-layer barrier plastic packaging films

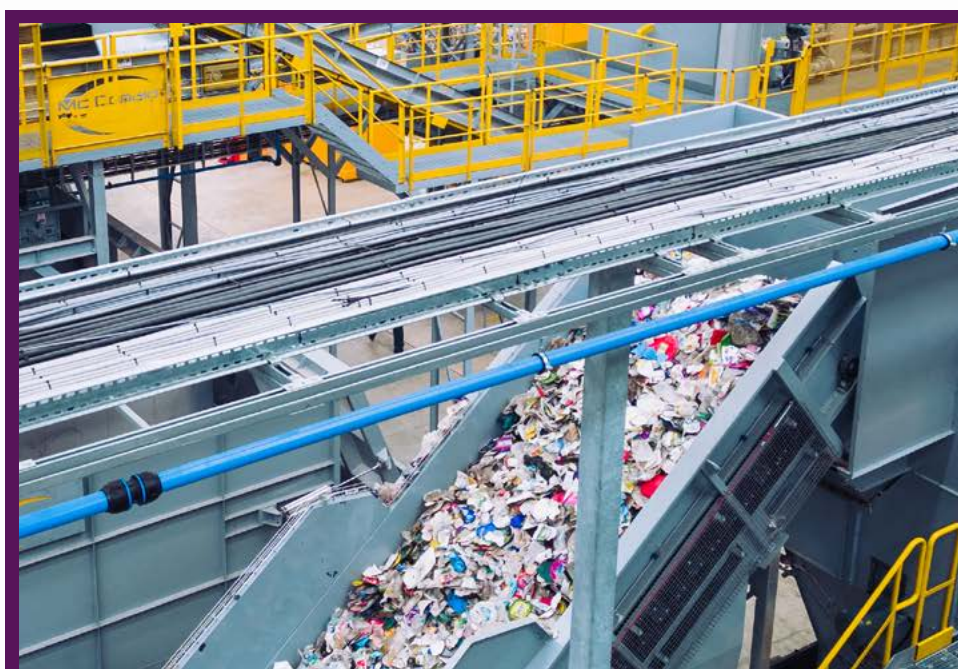
to be recycled into high-value applications. The project brings together Interface's Polarfin® additive technology that overcomes molecular non-compatibility between mixed polyolefins and polar polymers e.g. Nylon, EVOH and PET to enable them to be recycled, and Flexipol's film technology expertise and manufacturing capabilities. Interface now has a pilot plant operating in India.



Food-grade polypropylene recycling

Berry Global's new CleanStream[®] plant in Leamington Spa is the world's first closed-loop system to mechanically recycle post-consumer polypropylene packaging waste back into food-grade recyclate, 'closing the loop' for contact-sensitive cosmetics, personal care, and food packaging.

The process improves on traditional mechanical recycling through innovation in artificial intelligence-based sorting, washing and decontamination, and stringent material testing to deliver ultra-high levels of recycled polymer purity.



Recycling challenging packaging formats

In 2024, Mura Technology will launch ReNew ELP, a world-first, commercial scale recycling plant using Mura's hydrothermal advanced recycling process HydroPRS[™]. Now in final commissioning, the plant can recycle post-consumer plastic packaging, including 'unrecyclable'

formats such as flexibles and multi-layered films, into hydrocarbon feedstocks for manufacturing new plastic. As well as providing a circular solution for plastic waste, the process saves around 80% of carbon emissions compared to incineration.



Water-powered recycling

Stopford Ltd and the University of Birmingham are co-developing a recycling process (Solvergy[™]) which uses hot compressed water as a green solvent to selectively depolymerise plastic waste streams into simple chemicals that can be re-used as feedstocks for circular plastic production. The aim is to help increase plastic recycling rates and decarbonise plastic production. A prototype reactor for hard-to-recycle polyolefin-based plastic packaging is already operational, and the project partners are now looking to adapt the process to PET plastic waste.



Pyrolysis with microwaves for hard-to-recycle plastics

Sylatech Ltd has developed a new microwave pyrolysis process to recycle mixed

and dirty plastic films and flexibles. This highly efficient technology heats waste in the absence of oxygen to break molecular bonds, producing a Pyrolysis Oil from which new virgin-grade plastic can be made. Having been well supported by Innovate through the SSPP programme, Sylatech is heading towards the production phase. (Pictured: Sylatech MD Charlie Breese)





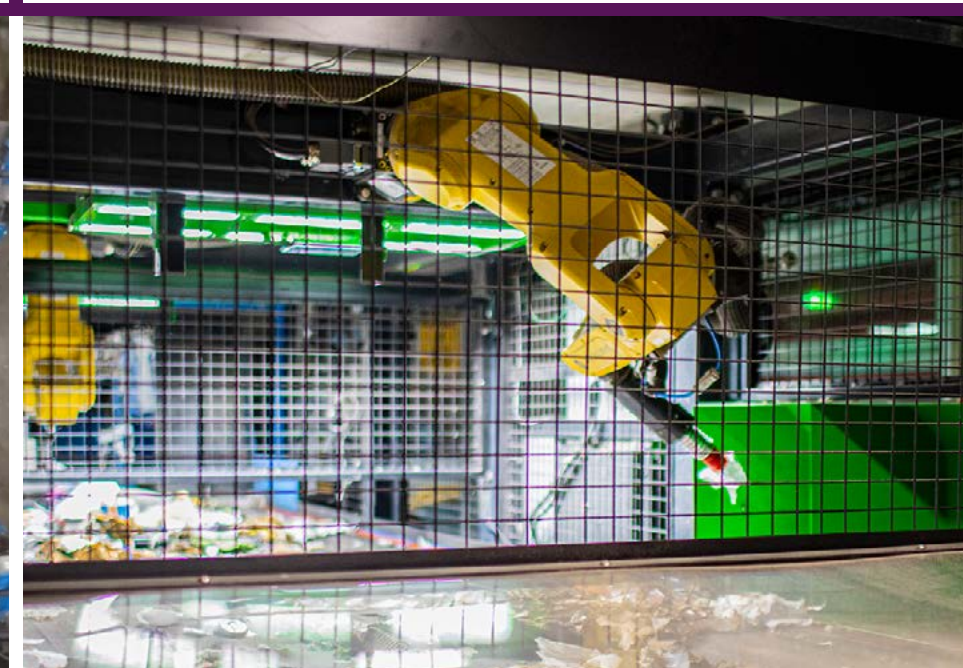
New solution for mono-layer recycling

Impact Recycling's novel, disruptive Baffled Oscillation Separation System (BOSS) technology is a water-based density separation technology designed to separate post-consumer laminated and multi-layer films from mono-layer polyolefin films. By separating the two waste streams to 95% purity, the BOSS process allows mono-layer flexibles to be recycled into high-quality consumer-grade plastic packaging. SSPP funding is supporting the construction of the first commercial scale demonstrator plant, due online in 2025.



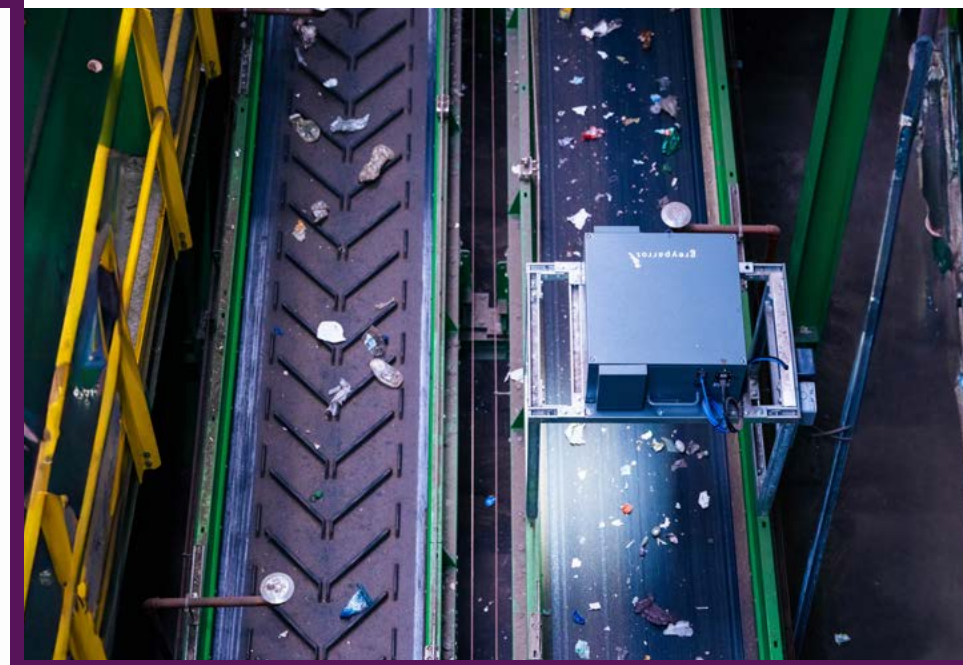
The power of AI

Project ADER (Automated Detection, Ejection & Recovery), led by Recycleye, combines the firm's low-cost AI-powered system with near-infra-red to sort packaging waste for recycling. Using advanced machine learning algorithms and Recycleye's WasteNet - a visual database of 2.5 million items – the innovation delivers higher granularity, speed, and affordability. Recycleye has also redesigned its robotic gripping function – the GRIP-R – to effectively handle films and flexible packaging and blockages.



Smarter sorting

Greyparrot has developed a hybrid AI/Near-Infrared (NIR) waste recognition system to enhance the operational efficiency of sorting plants and increase recycling rates through waste analytics. The system can identify all types of materials and waste items, including the ones not recognised by previous NIR systems, and provides a new level of insight into recycling operations. Earlier this year, the company signed a strategic partnership with major Dutch recycling solution firm Bollegraaf to accelerate the digitisation of the waste sector.



Smart tech for reusables

Optimising the logistics for reusable packaging is critical to tracking reusable food-grade plastic packaging and enabling scalable infrastructure. The Trace project, led by Pragmatic



Semiconductor, enables rapid sorting and automation, optimisation of reusable asset flows, and consumer engagement. Low-cost RFID tags based on Pragmatic's technology, which are about to be trialed with a major UK retailer, can be embedded directly into individual pieces of packaging or applied as a durable RFID-enabled label that is tough enough to withstand many wash cycles.