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Innovate UK

Driving plastic packaging innovation



Smart Sustainable Plastic Packaging Challenge

We can advise, connect and inspire you. With a portfolio of over 80 funded projects, UKRI's 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.



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reuse, refill, return

Ramping up returnables

2024 will be an exciting year for [Reposit](#), a collaborative reusable packaging platform for FMCG products sold through traditional retail and e-commerce. Recently, M&S announced the expansion of its 'Refilled' scheme, delivered in partnership with Reposit, to 19 more UK stores. Working with environmental charity City to Sea, the platform is teaming up with Ecover to install refill stations in a number of Waitrose stores by spring 2024 and with Amazon to explore the introduction of returnables for homecare, beauty and food products.



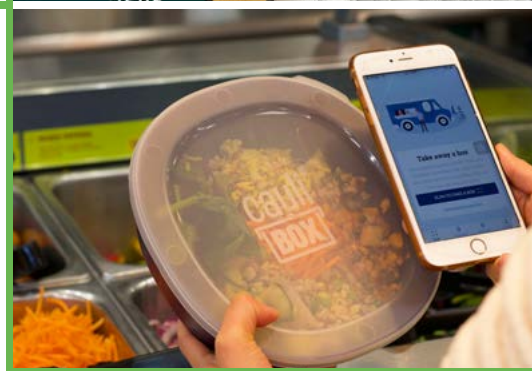
Smart tech for reusable packaging

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.



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 trialed 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.



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 its 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.



Greener decontamination

Nextek's [COtooCLEAN](#) process is a waterless cleaning process for polyolefin films based on low-pressure super-critical CO₂ and green co-solvents. It decontaminates these packaging films back to food-grade material by removing oils, fats, and inks. More environmentally friendly than other processes that use water, caustic soda or surfactants, the COtooCLEAN process supports circularity in food-grade film packaging and 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 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. It has recently published the first report on how Near Infrared (NIR) devices see and classify a range of flexible packaging formats and materials.



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.



New opportunity for mono-layer recycling

[Impact Recycling's](#) BOSS (Baffled Oscillation Separation System) 2D system is a disruptive recycling technology

that separates post-consumer laminated and multi-layer films from mono-layer polyolefin films. By efficiently separating this difficult, mixed waste stream, the technology can deliver high purity PE and PP material streams for recycling back into new plastic packaging. SSPP funding is supporting the construction of the first commercial scale demonstrator plant, due online in 2025.





The power of seaweed

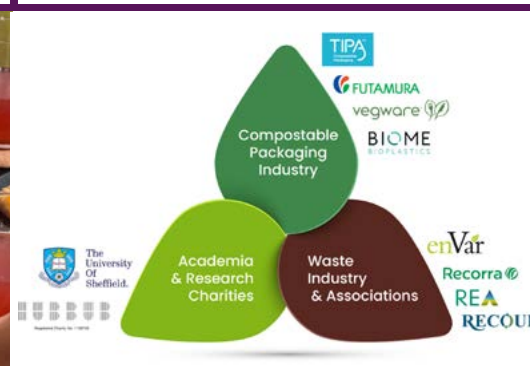
Winner of the prestigious Earthshot Prize, [Notpla](#) are famed for innovative, scalable alternatives to plastic made from seaweed and plants. These include edible liquid bubbles – Ooho, seaweed-coated food containers, single-use films and rigid materials. Notpla’s solutions have already eliminated 4.2 million pieces of single-use plastic and their seaweed-based packaging has recently been recognised by the Dutch government as the first and only material to meet strict plastic-free criteria under the EU’s Single-Use Plastics Directive.



The future of compostables

[Compostable Coalition UK](#) is a multi-stakeholder research project focusing on the efficacy of collecting and organically recycling compostable packaging via UK’s existing infrastructure. Research areas include consumer behaviour, labelling, sortation, composting

performance and environmental impact. The project also includes a cost-benefits analysis conducted by Eunomia Research & Consulting. Project partners include TIPA, Futamura, Vegware, Biome, EnVar, Recorra, REA, RECOUP, University of Sheffield, and Hubbub.



Personal care in a pod

PlantSea-Pack is seaweed-derived film technology developed by [PlantSea](#) for personal care products. This innovative packaging solution consists of water-soluble pods designed for single-use or refill applications for products such as shampoos, conditioners, shower gels, oils and creams. Funding from SSPP is allowing PlantSea to assess the feasibility and accelerate the scaling-up of the capsules and refill-at-home system, working with the concept further and work with partners including Bangor University, Olew Hair and Sainsbury’s to assess its technical and market potential.



Plant-based alternatives

[Xampla](#) has developed a range of plant-based films, coatings and microcapsules, including edible films, which offer exciting opportunities to reduce single-use plastics. With funding from

the SSPP Challenge, the firm has gone from strength to strength, forming partnerships with major brands including Gousto, Britvic and ELEMIS. In autumn 2023 Xampla launched a consumer brand, [Morro](#), and is now scaling up production following the recent announcement of a manufacturing deal with the 2M Group of Companies.





rigids & food-grade

Hot off the shelf

Waddington Europe, a Novolex brand, has developed a revolutionary product for hot food packaging: the patented rPET220 is heat resistant, clear and manufactured without any additives. Unlike traditional PP and CPET containers, which are heavier, opaque, and can only be downcycled, rPET220 is light, clear, can withstand cooking temperatures of up to 220°C, and is microwavable. Perfect for ready meals and sauces, it is easily recyclable back into food-grade plastic, reduces carbon footprint, and preserves valuable resources.



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.



Packaging design optimisation

Blow Moulding Technologies Ltd has developed software to support more sustainable plastic packaging materials and designs for the plastic bottle industry, an industry that has a global worth of £129 billion and is manufacturing bottles at a rate of 1 million/min. The company's software automates the bottle design process, allowing packaging to be designed and manufactured with just the right amount of material to reduce wastage, and supports the faster uptake of new materials and increased recycled content.



Mapping marine plastic pollution



Marine plastic pollution is one of today's most significant environmental challenges, with some 14 Mt of plastic waste flowing into the ocean each year and rising. Using satellite

data and Artificial Intelligence, Plastic-i is building a platform to facilitate the identification and removal of marine plastic on a global scale. By detecting, mapping, and classifying floating debris, it will provide decision makers and clean-up operators with actionable insights to boost effectiveness and measure the success of interventions.

Photo: Plastic-i debris predictions for the coastline of the Dominican Republic Nov 2022