

Results of Competition: Ocean Plastic Solutions Investment Accelerator: Reducing Plastic Pollution

Competition Code: 1901_IA_OCEANS

Total available funding is £1million grant funding and £1million private investment

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
OCEANIUM LTD	Oceanium: Seaweed-based compostable, marine safe bio-packaging	£199,512	£99,756

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

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Project description - provided by applicants

The Oceanium project is focused on developing innovative, circular life-cycle bio-packaging derived from sustainably sourced seaweed to replace single use fossil-fuel based plastics to meet the growing consumer, government and corporate demand for sustainable packaging.

Oceanium's focus is a home-compostable/marine safe bio-film and bio-container designed for food packaging. Seaweed is an environmentally friendly feedstock as it does not require cleared land, fresh water, fertiliser or insecticide. Seaweed acts as a carbon sink sequestering greenhouse gases and it absorbs excess nitrogen and phosphorous from surrounding water bio-remediating ocean eutrophication. Oceanium will launch its Oceanware bio-packaging material in a timely manner enabling governments and corporates to meet ambitious 100% recyclable, reusable and compostable targets. Importantly, Oceanium's development of innovative seaweed based materials will provide jobs and economic opportunities throughout the products' circular value-chain whilst accelerating the transition to a sustainable economy.

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PHASE PHOTONICS LTD	Enhanced Hyperspectral Recycling System (e-HyReS)	£125,852	£88,096

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Phase will develop a Hyperspectral camera system which overcomes key limitations of current technology. These improvements to the system will increase the amount of plastic material than can be identified in recycling centres. The output will also be a purer, so the recycled material will be suitable for a greater number of applications.

By making plastics recycling economically profitable, we hope to play a role in reducing the plastics that are discarded and end up in our oceans, or put into landfill where they will be long term pollutants in our environment.

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MELLIZYME BIOTECHNOLOGY LIMITED	A microbial system that degrades polyethylene, polypropylene and related plastics at high rates	£188,800	£132,160

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Project description - provided by applicants

The accumulation of (micro)plastics in the environment, especially in rivers and oceans, is a massive and well-known problem. Most of these plastics (polyethylene, polypropylene, polystyrene) have purely alkyl chain backbones, which makes them recalcitrant to biodegradation. Our initial focus is on the controlled biodegradation of plastics under contained conditions. We have recently isolated a microorganism that secretes a potent enzyme activity capable of degrading polyethylene and other plastics with alkyl chain backbones lacking ester linkages. The aim of the project is to characterise and improve these activities to enable further commercial development and exploitation of the enzymes involved. In particular, We (Mellizyme Biotechnology) will have developed a process with a proprietary enzyme, to address the plastics removal step in coffee cup recycling. The process has wide-ranging applicability to many other plastics and processes.

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H. DAWSON SONS AND COMPANY (WOOL) LIMITED	Reducing Microfibre Ocean Plastic Pollution by Biodegradable Material Substitution	£199,906	£89,958

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Project description - provided by applicants

Sheep need to be shorn each year to adapt more easily to the warmer British spring & summer conditions. This is a loss-making expense to the farmer as the fleece is worth less than the clipping fee. Current intensive farming strategies are more reliant on chemicals to allow for economies of scale techniques. Sheep are reared for their meat in the UK; provenance of food has become more important since the horsemeat scandal. Antipodean varieties produce a finer fibre (the warmer conditions mean a softer fleece) which is suitable for wearing next-to-the-skin; the best British wool can hope for is carpet-type applications.

HDWool intend to develop a replacement for polyester insulation; the main challenge being to create a composite that is stable enough for the domestic laundry process. To go in tandem with this is to set up a traceable system for the , as well as to encourage holistic farming practice by paying a fairer price for the fibre.

To achieve this will mean combining green chemistry to create a product that will still biodegrade safely in both compost & the sea so that its natural warmth (& breathable), flame retardance, moisture management, and smell absorbance can be used in textile applications - in replacement of the polyester fibres which have been highlighted as entering and the sea, sea-life and food chains due to the laundry process.

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FLEXI-HEX LTD	Flexi-Hex E-Commerce Packaging for Bottles	£110,576	£77,403

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Project description - provided by applicants

Flexi-Hex is an innovative new sustainable packaging system for bottles created in response to the increasing number of e-commerce drinks sales and the demand by e-commerce companies to improve their environmental credentials by going 'plastic free'.

Flexi-Hex is simply made from recycled paper yet is surprisingly strong and durable. The unique honeycomb design gives the packaging high compression resistance and the unique cellular structure of Flexi-Hex allows flexibility to fit irregular bottle shapes and sizes. The honeycomb geometry is unique in that it expands to create a sleeve 35 times wider than its compressed form. Flexi-hex is also lightweight and in its compressed form takes up little storage space. The system's flexibility is pragmatic for compact lightweight portability.

With public awareness around single-use plastics and the devastating effect on the marine environment at an all-time high, developing a sustainable plastic-free packaging system for e-commerce drinks sales will offer a solution to reduce the considerable amount of plastic waste companies generate, reducing their environmental footprint.

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SANITARY OWL LTD	Research and Development of a Holistic Circular Packaging System	£185,367	£83,415

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Project description - provided by applicants

DAME is on a mission to eradicate plastic waste from the bathroom. In 2019 we launched D, the world's first reusable tampon applicator, offering consumers a convenient alternative to the 3.5 million single-use plastic applicators thrown away every day in the UK. Our Kickstarter campaign achieved global media attention. Before we'd even launched the product we won a prestigious Dezeen Design Award and were approached by all 5 major grocers and both the largest pharmacies in the UK. In 2019 our applicator and plastic-free tampons were launched nationwide in Waitrose stores and direct-to-consumers via our website.

With the support of Innovate UK and SOV we want to develop our next breakthrough solutions that make it easy for consumers to switch from single-use to reusable products. Almost all beauty and personal care products are sold in single-use plastic packaging, and recycling rates are abnormally low in bathrooms (50% recycle rate in UK bathrooms and 20% in the US, compared to nearer 90% in kitchens). Efforts are being made to increase both the recycled content and recyclability of disposable packaging, and while this is important work, we will never meet the scale of the challenge unless we address the root cause - consumption.

No circular, reusable personal care product has successfully achieved enough traction to effect change in the mass market. With a passionate, growing community of influential customers, demand from all major retailers in the UK and a proven record of product design, there's an immediate and unique opportunity for us to replace other single-use plastic bathroom products.

We will explore the best materials, product designs, service designs and marketing campaigns for developing other reusable personal care products that meet the expectations and needs of consumers. To find the models that work, we have chosen product categories with relatively little personalisation, so we can test with a broad customer base. Those products are hand soaps and deodorant.

We will validate if it's possible to create a desirable dispenser and refill service (available both in major retailers and via subscription), that has zero single-use plastic, zero virgin materials, is convenient, affordable and better than incumbent, disposable offerings.

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BAGBOARD LTD	Measuring the commercial value of plastic offsetting as an incentive to change consumer behaviour towards advertising.	£191,622	£86,230

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Project description - provided by applicants

****What We Do****

Bagboard is a new kind of advertising platform that is a force for good. We empower people to help prevent plastic pollution through the medium of advertising.

Our premium, reusable and recyclable kraft paper bags replace single-use plastic ones in retail stores all over London. There's no cost to the shopkeeper or the customer, because it's all funded by advertising on the front and back panels of the bags.

Each bag gives consumers the opportunity to do even more for the environment. By downloading the Bagboard app, they can scan the bag and interact with the advertising digitally. Every time they do, we direct advertising revenue towards removing plastic from the environment.

****How it works****

Bagboard prints the bags with the advertiser's artwork and distributes them to our retail network. We work with 2,000 independent stores who currently don't use branded bags and replace their single-use plastic bags with our eco-friendly ones. Customers then pick up the bags from retailers and take them on an onward journey.

Then by downloading our app, the consumers can scan the bag with their phone and engage digitally with the ad. When they do, content comes to life with unique brand experiences from videos to games or augmented reality. Every time someone engages, we reward them by offsetting 1KG plastic from the ocean in partnership with The Plastic Bank.

****Our Project****

Our platform rewards people for engaging with our bags digitally. We want to showcase that an environmental incentive, such as offsetting plastic, will cause an uplift in these engagements. We'll then be able to convince advertisers to spend more of their budgets towards funding such initiatives. This will provide a huge a stepping stone to use advertising as a force for good.

****Our mission****

Our aim is to bring brands, consumers and retailers together in order to help direct the billions of pounds spent on advertising, towards driving sustainability. And it all starts with a bag.

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PETIT PLI LIMITED	Petit Pli - Expanding Clothes That Grow	£191,414	£95,707

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Project description - provided by applicants

Petit Pli is the most innovative and sustainable childrenswear company in the world. Petit Pli creates 100% PET outerwear ensembles that grow with children, through 7 discrete sizes (fitting children aged between 9 months and 4 years) by embedding a patent-pending technology in garments. With children growing through 7 discrete sizes in their first two years on Earth, Petit Pli's circular approach to garment design and technology significantly reduces waste & emissions generated at point of production, transportation and use.

Further, Petit Pli's garments act on a psychological level reframe clothing and plastic value (ahead of an exploding population), along with decelerating childrenswear obsolescence by extending the use-life of garments to reduce the volume of discarded garments entering the wider environment. Petit Pli achieves this by embedding a patent-pending structure in machine washable, rainproof, windproof outerwear childrenswear ensemble garments

In this 12 month industrial research project Petit Pli seeks to carry out industrial research to improve the circularity of existing suits and development of new IP and products. Below are the three main outcomes of the project.

1. Improve circularity of existing products - conducting R&D into using Petit Pli's patent-pending technology with recycled PET fibres, with the intention of creating suits for sale composed of recycled PET fabrics.
2. Develop new IP - Petit Pli have identified new expansion innovation involving the creation of composite PET fibres using recycled/virgin PET which stands to further improve PP suit durability and climate versatility.
3. Develop new products - Petit Pli intends to exploit knowledge gained from prior Innovate UK Project 25130 feasibility study into maternity market for investigative engineering of maternity and mobility apparel production prototypes.

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CHOOSE WATER LIMITED	Development and scale-up of the Choose Water recycled paper bottle -the world's first long-shelf life, plastic-replacement bottle made from 100% biodegradable materials	£199,319	£99,660

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Project description - provided by applicants

Each year the UK throws away over 13bn plastic bottles and 5bn items of plastic-coated paper packaging such as coffee cups, cartons and salad boxes. Although plastic bottles are relatively easy to recycle, UK recycling rates of 45% (WRAP;2018) mean the majority end up in landfill, or worse the ocean.

Plastic-coated paper packaging presents a more complicated problem -- despite using 95% recycled materials the high cost associated with separating the materials means 125,000 tonnes going to landfill every year.

Following 12-months research, we have developed a prototype 500ml bottle made solely out of recycled paper, with unique waterproof lining made out 100% natural, biodegradable materials. The liner represents the holy grail within the packaging industry and the technology has significant potential both in the development of bottles and use in wider packaging for liquids, ready meals and other modified atmosphere packaging- reducing the reliance on plastic and plastic lining for packaging.

We are currently reliant on multiple third-parties for the design and manufacture of the recycled paper bottle, with the lining, filling and capping taking place manually at our production facility. This is inefficient, not scalable and hinders our ability to undertake further R&D.

Having demonstrated the potential of the liner and paper casing, we now need to refine the liner and develop the unique hardware machinery needed exploit the market opportunity.

Internally, the project will;

1. Enable us to get to market quickly, demonstrate industrial feasibility (EOIs already received from: Sky, Eurostar) a
2. Produce at volume (100p/d - 1,800 p/d) and reduce our cost per bottle from 60p to 14p through automation, down to ~5p at scale - comparable to PET.
3. Enable us to undertake further R&D, experimenting with other forms of recycled material packaging (bamboo, wood pulp etc), smaller bottles (down to 50ml - a major source of single-use plastic waste), different structures (ready meal or modified atmosphere trays etc) and act as a platform to develop the unique liner technology.

More widely, the technology will help the UK reduce its plastic bottle usage by 1mi items by Y5, saving over 140,000 kg in CO2 in line with UK GOVs 'Plastic Pact' 2025 commitment.

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