The plastic solution

Alison Coleman speaks to a range of companies about how they are combatting the plastic problem while still turning a profit

From the eight million tonnes of plastic that end up in the oceans each year, to the 91% of global plastic waste that isn't being recycled, the scale of the threat posed to the planet by plastic waste has galvanised public opinion. It has sparked government legislation and mobilised some truly innovative businesses to come up with effective solutions, from clearing plastic from rivers and oceans to finding smarter ways of recycling it.

In truth many of the negative impacts of plastic, such as accumulation in oceans, had already been identified as early as the 1970s. So while *Blue Planet II* prompted a huge public outcry, the current heightened awareness of the plastics issue is a consequence of the modern networked society that facilitates people to recognise, and then rapidly organise, around issues of contention.

Frank Boons, professor of innovation and sustainability at Alliance Manchester Business School, explains: "This surge in attention and the actual innovations that are being implemented build on work that has been ongoing behind the scenes for years. For instance, work by WRAP - Waste & Resources Action Programme - by the organisations involved in putting in place a ban on the use of plastic micro-beads, and by researchers who have been working on fundamental research that now feeds solutions that are urgently needed."

A NEW HOPE

In protecting food and making cars lighter, plastic is a valuable material and an ally in the war on carbon. However, developing the capacity to recycle the vast majority of it is absolutely essential. Recycling Technologies, based in Swindon, has developed a technology that recycles waste plastic previously deemed unrecyclable - including crisp packets, rigid yogurt pots and films - into an oil that can be used to remake plastic.

The technology has its roots in research originally carried out by engineers at Warwick University. Adrian Griffiths, founder and CEO of Recycling Technologies, saw its potential and his team developed the RT7000, a machine that uses a process called pyrolysis to thermally crack the plastic using heat in an atmosphere free of oxygen. It can recycle a

7,000
Tonnes of plastic waste the RT7000 machine will be able to recycle per year

300m
Number of plastic bottle caps Composite Prime has diverted from landfill in the last six months

30%
Minimum of recycled material there must be in plastic packaging by 2022

comprehensive range of mixed plastic waste back into the oil it originally came from. The oil, called Plaxx, can be used by the petrochemical sector to make new plastics, creating a truly circular economy.

Recycling Technologies' commercial director Ravish Jain says: "By using Plaxx oil as a feedstock for making new plastics, the loop is being closed on many more types of plastics and packaging formats, including multi-layered food pouches and crisp packets."

This year the first RT7000 will be installed in Perthshire, with initial plans to install 12 machines in the UK and EU. Each machine is capable of recycling 7,000 tonnes of mixed plastic waste per year, producing around 5,200 tonnes of Plaxx.

"Our goal is 1,300 RT7000 machines worldwide by 2027, capable of diverting 10 million tonnes of plastic waste from landfill or incineration each year and producing seven million tonnes of Plaxx to replace fossil oils in new polymer production," says Jain.

As part of the recently announced Resources and Waste Strategy, the government is now consulting on a proposal for manufacturers and importers of plastic packaging to use plastics composed of at least 30% recycled material or face a tax from 2022. This makes the drive towards a circular economy and the need for recycling capacity more pressing. Walkers (the crisp manufacturer) has joined more than 60 other major food and drink businesses - responsible for 80% of the packaging on grocery shelves - in pledging commitment to The UK Plastics Pact to use only 100% recyclable, reusable or compostable plastic packaging by 2025.

SECOND LIFE

Other milestone innovations in the reuse of waste plastic are emerging across all sectors of industry. The shocking state of some of Britain's roads has been well documented. But one Scottish company, MacRebur, has developed a way of mixing waste plastics destined for landfill, such as bags, bottles, film wrapping and cups, with bitumen to produce a new type of asphalt material used to build environmentally friendly, more durable roads.

In the consumer market, people investing in their homes and gardens are making more responsible and sustainable buying decisions. Composite Prime produces eco-friendly composite garden decking by combining recycled plastic with Forest Stewardship Council (FSC) certified end-of-life timber. In the last six months alone the company has recycled more than 25 million milk bottles and 300 million plastic bottle caps, all destined for landfill, in creating its eco-friendly products.

Eco-friendly garden decking

Composite Prime sources its waste plastic from high-density polyethylene (HDPE) plastic bottles, typically used for milk bottles and shampoo bottles, that would otherwise end up as yet more landfill.

Another area of concern is the huge volume of food packaging that can't be recycled because it is contaminated by the food it had contained and therefore has to go to landfill, incurring costs and increasing the environmental impact.

Launched in 2008, Vegware came up with a solution; a range of catering disposables and

CASE STUDY
ICHTHION

Clearing the oceans of plastic waste is arguably the toughest of the plastic challenges. Tech start-up Ichthion has spent the last 18 months developing three technology plastics solutions, Azure, Cobalt and Ultramarine, capable of extracting a large amount of plastic from any water stream.

Inty Grønneberg, Ichthion's chief executive and co-founder, was named one of MIT Technology Review's top innovators under 35 in Latin America last year.

"Azure is a system that can be deployed in rivers," explains Grønneberg. "Between 60% and 90% of the plastic that ends up in the ocean comes from rivers, so this is currently our main focus. It's easier to extract large amounts of plastic from rivers than from oceans, where it degrades on contact with salt water and breaks down into micro plastics."

Cobalt will be deployed in coastal areas, while Ultramarine will ultimately be retrofitted to large vessels so they can collect microplastics while they travel. The company has raised almost £1m in funding for the next two years, including £500,000 from Innovate UK.

"We have been testing these technologies and had very good results," says Grønneberg, fresh from a visit to South America where Ichthion signed an agreement with the government of Ecuador to deploy the first Azure systems there. "Once it is fully optimised, the technology will be licenced for wider global use, particularly in Asia, Africa, and Latin America – the biggest contributors to plastic pollution in the world's oceans."

Vegware's catering disposables

packaging made from plants, not plastic, using renewable, lower carbon or recycled materials, that can all be commercially composted with food waste. Its clients include contract caterers, food distributors, universities and colleges, corporate offices with dining facilities and independent delis and cafés.

Among the raw materials used is bagasse, reclaimed fibre left over from sugar cane pressing, and polylactic acid, a plastic substitute made from fermented plant starch, usually corn. Vessels made from bagasse enable food service operators to cut their costs and environmental impact and move towards zero waste.

Vegware has been positively affected by the *Blue Planet* effect, with its latest turnover of £30.7m up 53% on the previous year. Staff numbers have also increased, from 26 to 75 in the last five years. Lucy Frankel, communications director, says: "Export is growing and now accounts for a third of our sales. We are seeing a global uplift especially in regions where plastics are being banned."

At the 2014 Finance for the Future awards, which recognise the role of finance in creating sustainable business models and economies, Vegware won the SME category.

"Public pressure for eco-friendly alternatives to plastic products has pushed retailers and brands to look for products that fulfil that demand"

ALTERNATIVE FUNDING

Funding the development and early growth stages of these innovative businesses is vital, with some development support available for businesses that are specifically addressing the plastic waste issue.

Innovate UK provides grant support for technology development companies in early, mid and pre-commercial stages. Local enterprise partnerships also support businesses that are contributing to regional economic prosperity and job creation. Sector specific funding is available from government for supporting clean-tech, low carbon, recycling and circular economy sector innovations. Applications for support can be made through relevant departments including Department for Business, Energy & Industrial Strategy and the Department for Environment, Food & Rural Affairs, or devolved administrations.

Recycling Technologies, for example, has raised £10.7m in equity investments, including crowdfunding, and secured £5.8m in grant funding from Innovate UK, the EU Horizon 2020 and Regional Growth Funds, crowdfunding and research and development loans to develop the technology and build the team.

"Without this funding and development support and partnership approach, it would have been impossible for Recycling Technologies to progress to its current position of commercialising the technology this year," says Jain. "It shows not only the importance of funding but also that we must work together and collaborate in order to change the future of plastics." ●

53%
Increase in Vegware's turnover year-on-year due to the *Blue Planet* effect

£10.7m
Amount Recycling Technologies has received in equity investments

CASE STUDY
RONALD BRITTON

Some plastic products have faced a particularly fierce environmental backlash, including glitter. Made from etched aluminium bonded to polyethylene terephthalate (PET), glitter is a form of microplastic that can find its way into the oceans and the marine creatures that live there.

Last summer saw the introduction of new UK legislation banning the use of plastic microbeads in rinse-off cosmetic products. This closed off a major market for the glitter industry. But at global metal powder and glitter supplier Ronald Britton, the move was welcomed. Having seen the plastics issue unfolding over the previous eight years the company had already come up with a solution: the world's first naturally degradable glitter, Bioglitter.

Based on plant material, Bioglitter is designed to degrade naturally in the environment. But the switch to naturally derived materials was not without challenges. Raw materials were more expensive, processing was more complex, and there were increased costs around the mandatory environmental testing and certification not required of a plastic product.

Ronald Britton is now working with some major beauty brands and retailers and entering new markets and sectors. As well as this, new versions of the product designed for different applications – printing, fabrics, horticulture and craft – has led to new revenue streams.

"Bioglitter is only slightly more expensive than polyester glitter and demand has been incredible," says commercial director Stephen Cotton. "The public pressure for eco-friendly alternatives to plastic products has pushed retailers and brands to look for products that fulfil that demand."