# An introduction to the Smart Sustainable Plastic Packaging Challenge

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UK Research and Innovation

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# WORKING TOWARDS A ZERO PLASTIC WASTE SOLUTION

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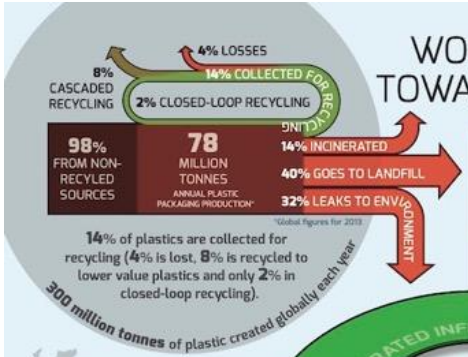



## IMPROVED RECYCLING TECHNOLOGIES

### CHEMICAL RECYCLING

Where mechanical recycling fails, polymer types (in mixed recycling) can be chemically separated at a molecular level.

### MECHANICAL RECYCLING

Effective separation and cleaning technologies preserve the integrity of polymer types – resulting in a higher quality recycled products that can be recycled multiple times.

## SMART SORTING TECHNOLOGIES

*Problem: The variety of plastics make it difficult to identify polymer types.*

### OPTICAL SORTING

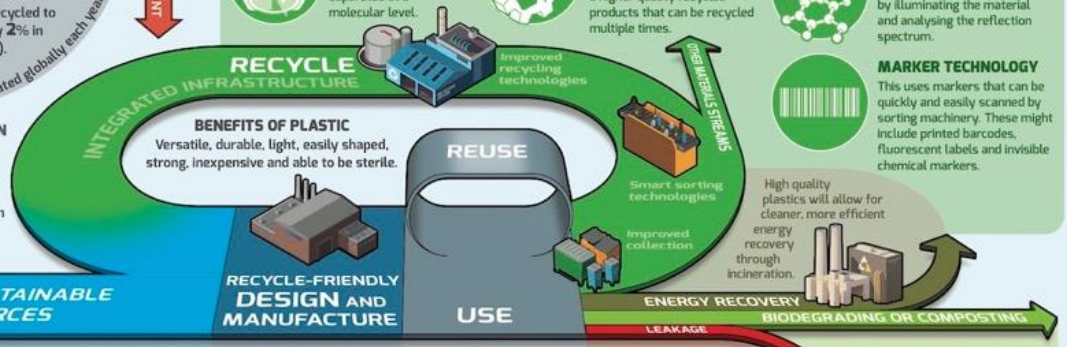
Optical sorting technologies can recognise polymer types by illuminating the material and analysing the reflection spectrum.

### MARKER TECHNOLOGY

This uses markers that can be quickly and easily scanned by sorting machinery. These might include printed barcodes, fluorescent labels and invisible chemical markers.

## UK PLASTICS CONSUMPTION

**44%** packaging
**7%** automotive,
**5%** electrical and electronic
**24%** building and construction
**20%** other




### FOSSIL FUELS

***Problem:*** *90% of plastics are derived from fossil fuel sources.*
**Solution:** Use organic sources such as algae, cellulose and starch.

Plastics can be manufactured from hydrocarbons derived from recaptured greenhouse gases.

### NEW CHEMISTRY

***Problem:*** *Plastic quality degrades during recycling, many plastics can only be recycled once.*
**Solution:** Develop a new 'super' polymer – a high-quality, high-value plastic that can be recycled multiple times.

Change behaviour – reduce leakage, cut use of single-use plastics, increase reuse, increase uptake of recycling.

***Problem:*** *Reducing leakage from 32% to 1% still results in one million tonnes of plastic material entering natural systems.*
**Solution:** Greater adoption of bio-benign materials would limit environmental damage.

### COMPOSTABLE PACKAGING

***Problem:*** *Many 'biodegradable' items are only such under laboratory, or industrial conditions.*
**Solution:** Develop truly biodegradable, or compostable plastics based on organic feedstocks.

### MONO MATERIAL PACKAGING

***Problem:*** *Packaging made up of multiple plastic types is hard to recycle.*
**Solution:** Design packaging made of single type plastics (mono materials).

### NEW JOINING TECHNOLOGY

***Problem:*** *Use of glues, screws and clips complicates the sorting process.*
**Solution:** Develop bio-inspired glues that break down to allow for easy plastics separation. Design mono material packaging with components that snap together – requiring no glue or screws.

### LIGHTWEIGHT PLASTIC

***Problem:*** *Unnecessary plastic volume.*
**Solution:** Reduce wall thickness and reinforce with ribs – greatly reducing the volume of plastic in the product.

### HARNESSING BEASTIES

UKRI scientists have been working with an enzyme that has been shown to break down plastics in landfills. Wax moth larvae have also been shown to be able to digest plastic bags and scientists have also identified a plastic-eating bacteria.

### MARINE DEGRADABILITY

***Problem:*** *Most biodegradable plastics merely fragment in the environment – increasing microplastics in the oceans.*
**Solution:** Develop truly marine degradable plastics.

Infographic: BEN GILLILAND Sources: UKRI, Ellen MacArthur Foundation

## AIM

To establish the UK as a leading innovator in smart and sustainable plastic packaging for consumer products, delivering cleaner growth across the supply chain, with a dramatic reduction in plastic waste entering the environment by 2025.

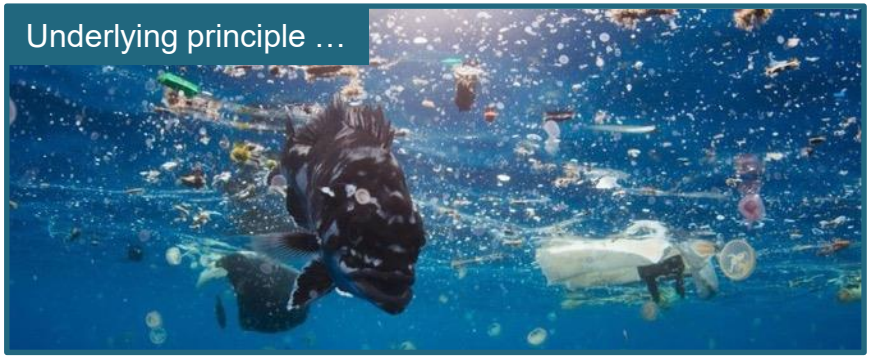
## TARGET

THE UK PLASTICS PACT

## OBJECTIVES

- To unlock a significant overall increase in R&I spend (government and industry).
- To deliver R&I to support more sustainable plastic packaging in line with the UK Plastic Pact targets.
- To increase UK plastic packaging supply chain collaboration.

## Underlying principle …



- **100%** of plastic packaging to be reusable, recyclable or compostable.
- **70%** of plastic packaging effectively recycled or composted.
- **30%** average recycled content across all plastic packaging.
- Take actions to **eliminate** problematic or unnecessary single-use packaging items through redesign, innovation or alternative (reuse) delivery models.

THE UK PLASTICS PACT

# The SSPP Programme - £60M over 5 years

## Core

A £2M investment to drive collaboration and systemic change

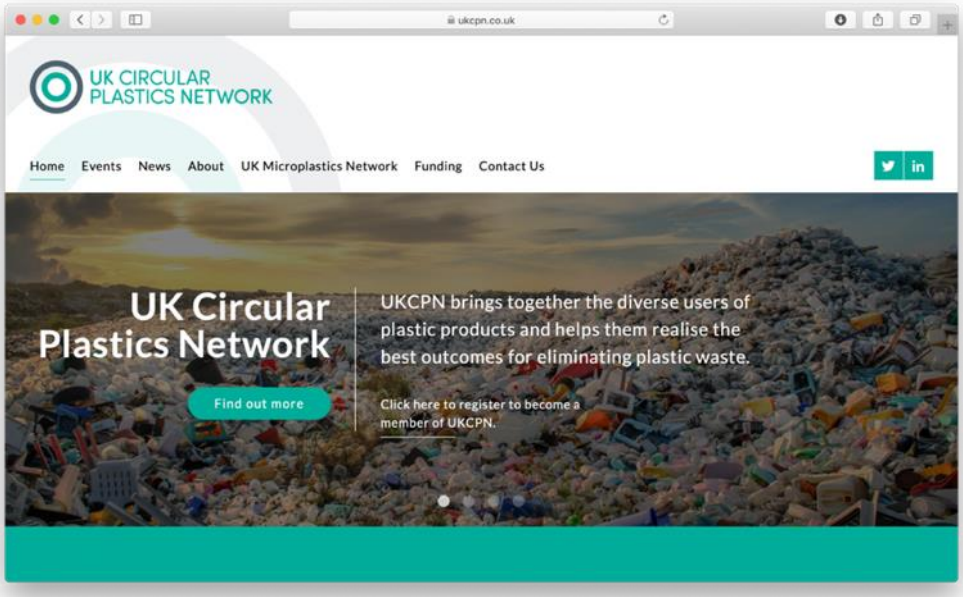
## Enabling Research

An £8M investment in academic research to support industry needs

## R&D Demonstration

An £50M investment in business –led R&D, including ‘first of a kind’ demonstrators

# Core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UK Circular Plastics Network
UKCPN brings together the diverse users of plastic products and helps them realise the best outcomes for eliminating plastic waste.
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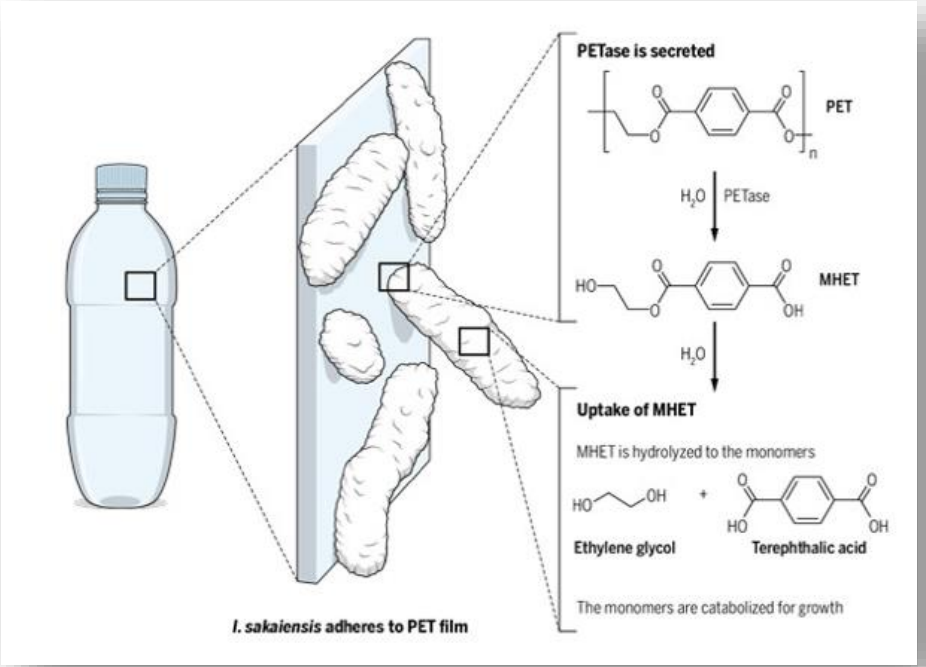
Click here to register to become a member of UKCPN.

# Enabling Research

# R&D

Feasibility

Industrial Research

Experimental Development

Demonstrator

# Environmental Impact, Carbon & LCA

# **Materials** Innovation

For example:

- new, recyclable polymer materials
- biopolymers
- improving ‘compatibilisation’ (making it easier to use more recycled content)
- alternatives to plastics for packaging applications (such as mycelium materials to replace expanded polystyrene) where plastic is the only current option

# **Design** innovation

for example:

- design for recyclability
- design for reuse
- making food delivery and other delivery packaging more recyclable
- ‘Smart’ marking and identification technologies to make sorting easier

# **Technology** Innovation

For example:

- reuse processes such as cleaning
- collection
- sorting and separation
- mechanical recycling
- chemical recycling
- anaerobic digestion or composting of compostable packaging
- Data

# **Business Model** innovation

For example:

- reusable packaging systems such as refill
- zero packaging business models and systems
- consumer or business behavioral change

# Thank you

For more information:

www.ukri.org/innovation/industrial-strategy-challenge-fund/

www.ukcpn.co.uk

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